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900

THE SYNDROME OF STUTTERING

by

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with

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Introduction by

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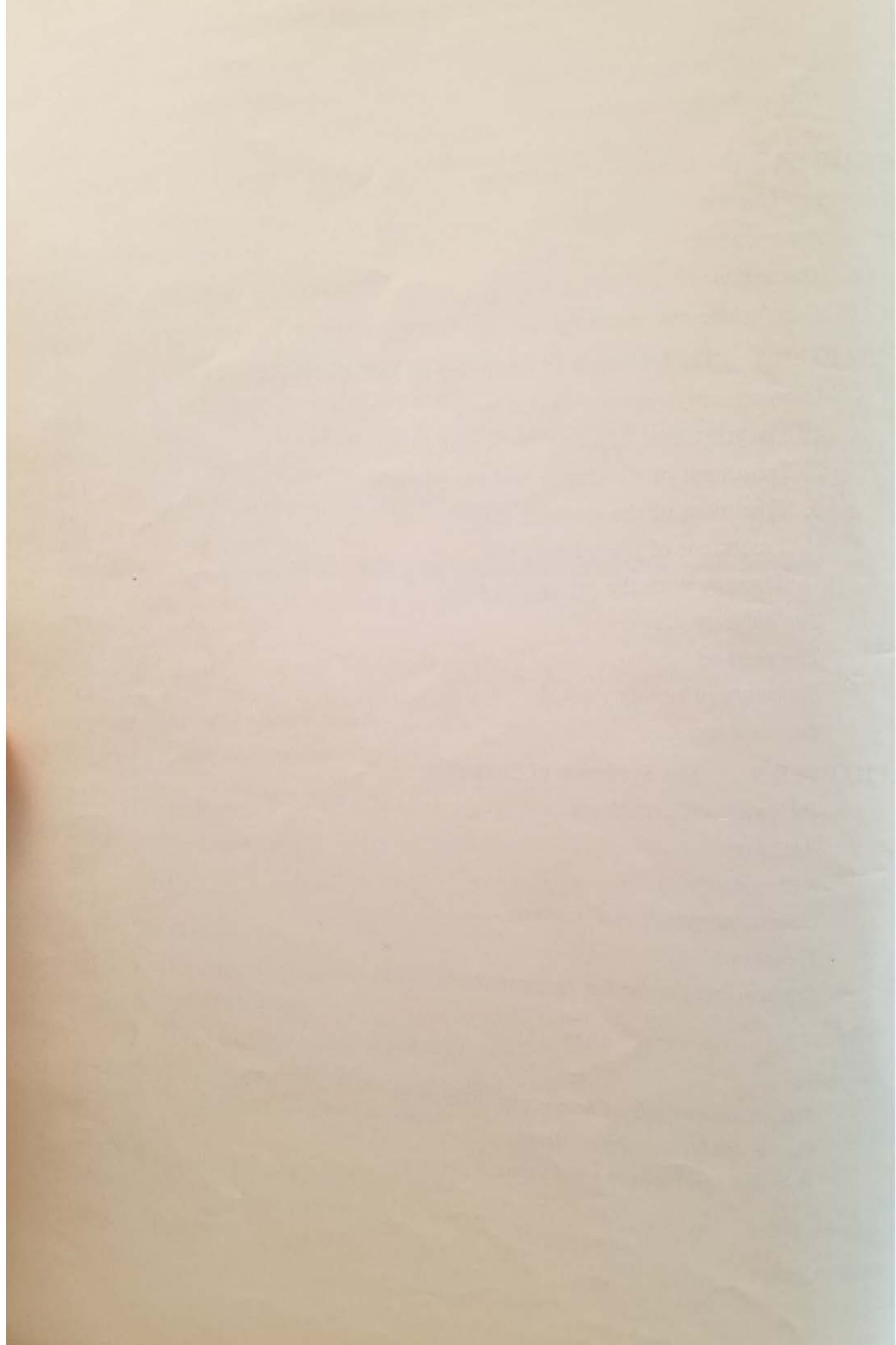
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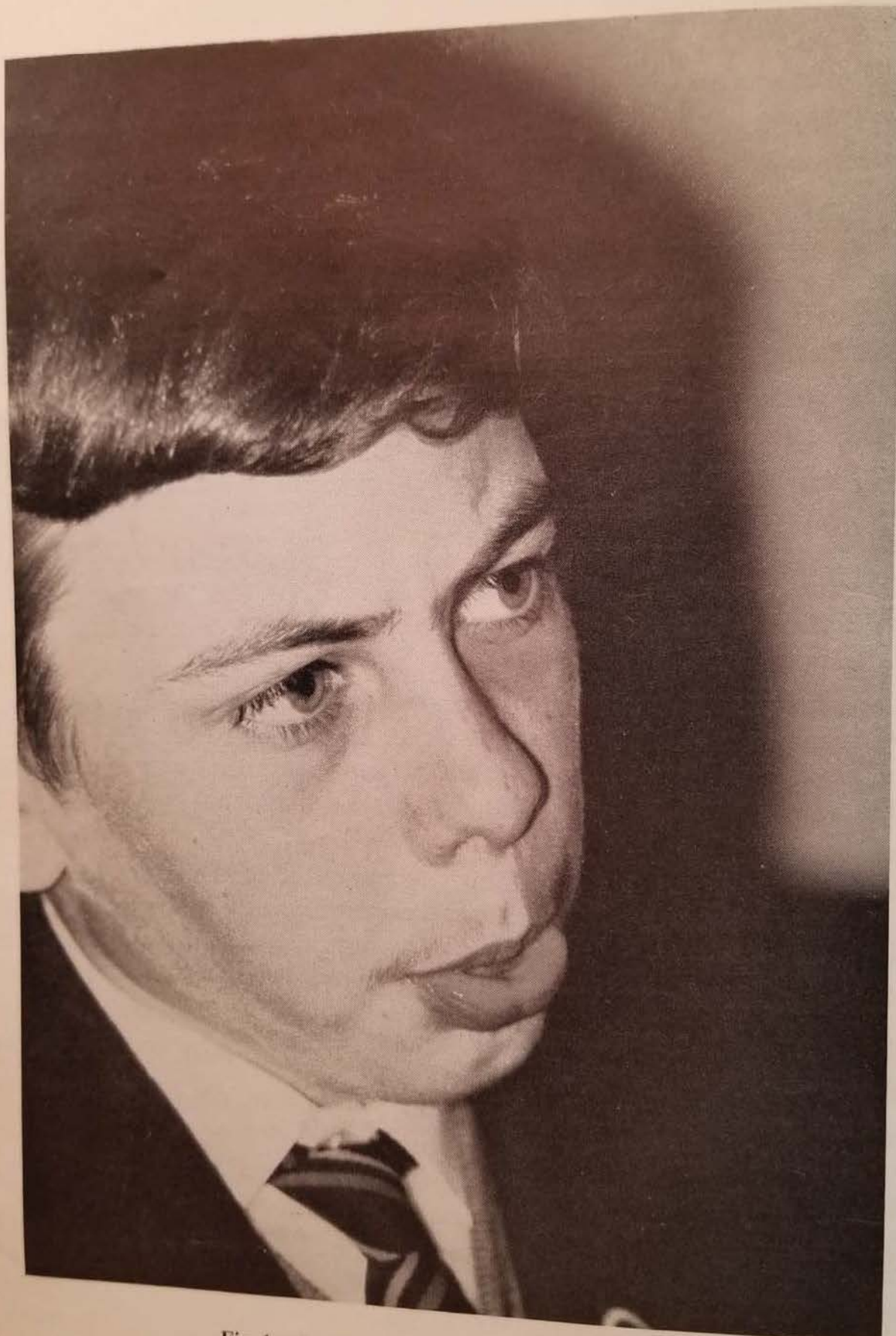


Fig 1. Facial grimace accompanying stutter

Introduction

Stuttering is a condition of many theories ranging from the genetic and neurological to the psychoanalytic and socio-cultural. In this respect it resembles many of the contemporary problems in the fields of mental health, medicine and the social sciences, in that genetic, environmental, psychological and social factors are all of some relevance and causes and effects are difficult to disentangle. In all these areas in treatment as in scientific enquiry, teams of workers have to learn to co-operate with one another. The study with which this book deals was such a collaborative venture which brought together paediatricians, psychiatrists, speech therapists, a psychologist and a psychiatric geneticist in a common effort. This team reflects the many-sidedness of the problem. However, the various disciplines have been brought together not merely in the hope that some of them at any rate would succeed in making new observations, but for more positive reasons that deserve brief consideration here.

There are some generally accepted facts known about stuttering which guide the investigator in his efforts to elucidate some of its causes. Most workers are agreed that stuttering generally commences before the age of five years and is thus mainly a disorder of childhood. Again, there appears to be some relationship between late development of speech and stuttering. A marked predominance of boys has been reported in almost every enquiry undertaken. It is also agreed that the condition is very prone to occur and to be transmitted down the generations within a relatively small proportion of families in the community. Whether this transmission reflects genetic or environmental factors is not wholly clear, although many workers consider that heredity contributes something to causation. It is also fairly widely accepted that emotional disturbances and the familial settings likely to generate them play some part either as causes, or as effects which then lead to vicious circles, or possibly in both these ways. Stuttering appears to be relatively common among children with cerebral diplegia and other forms of limited brain damage. The role of socio-cultural factors is uncertain, although some workers believe that stuttering is fostered in some and suppressed in other cultures.

Such a disparate array of facts suggests little except possibly that stuttering reflects a disturbance in some final common pathway, that can be caused in a number of different ways. But in the present state of knowledge one can do no better than guess at the precise nature of these causes, their relative importance or the ways in which they are related to or interact with each other.

Faced with a situation such as this, one logical approach to the problem is an attempt to widen the range of reliable facts about all possibly relevant aspects of the disorder. We therefore decided to conduct a comparative and broadly-based survey in a representative sample of stuttering subjects and controls, so as to ascertain how far characteristics of personality, intelligence and social and familial background

that have often been attributed to stutterers were, in fact, peculiar to them. Through the help and co-operation of the Local Education Authority, Dr. Andrews and Mrs. Mary Harris, who were among other things responsible for carrying out the field work, were able to conduct our enquiry within a population of 11-year-old school children. This had the additional advantage that stuttering subjects could be studied before the emotional complications which their distressing disability generates had developed or become too firmly ingrained.

The application of modern statistical techniques has transformed this kind of operation from mere pebble-counting, or even a preliminary sorting-out venture, into an experiment which can not only test hypotheses but also help to place classification on a sound and objective basis. The technique of factorial analysis helps in the identification of covarying clusters of features and in this way can reveal whether a group of subjects with some disability constitute a uniform or a number of distinct groups. The analysis conducted in this study showed in effect that there were three relatively separate forms of stutterer. They differed in respect of such features as social class origin, intelligence, personality of the mother, quality of family life, early or late onset of stutter and the presence of other intellectual and emotional disabilities. A classification of this kind can be no more than tentative. But it is obvious that it can provide a factual starting point for useful hypotheses. The utilisation of tentative groupings of this kind can also help to ensure that patients submitted to further investigation will be subdivided into relatively homogeneous groups. In this manner, enquiry, whether concerned with the definition of causes or the evaluation of treatment, might be enabled to lead to more clear and fruitful results.

In the past, theories of stuttering have sought to account for all aspects of the phenomenon, and when they have proved incompatible with certain observations they have tended to be regarded as wholly erroneous or irrelevant. However, a theory which fails to explain everything is not necessarily valueless; it may be relevant for one aspect of causation. The genetic factors that have emerged in this study are perhaps a good example in that they are clearly not adequate causes. But they may be a necessary prerequisite for the development of stuttering. The fact that the social, familial and psychological setting of stuttering can be so varied may lead some to conclude that it is no more than one symptom of a wide variety of conditions and that it is unfruitful to study the disturbance as such. This would probably be mistaken. Despite the varied background, the disability that is the end result shows in many respects a striking uniformity. This may arise either from the similarity of the underlying genetic factor or of the final pathway through which it is mediated; in either case a variety of environmental settings may provoke overt expression of a latent disability. A further point is that although some of the basic causes may, as our studies suggest, extend far back into early life to such factors as the personality and intelligence of the mother and the environment she creates for her child, this does not mean that attempts at treatment which are aimed directly at the disturbance of articulation are doomed to failure. It is now generally accepted that, under some circumstances, stuttering may be suspended in a proportion of subjects, or modified so as to become imperceptible, for variable periods. It is for this reason that an account of some preliminary experiments with one aspect of treatment which appears to deserve further

investigation, has been included. That it can produce remissions in a proportion of stuttering subjects and particularly in children seems clear. The duration of improvement and the precise value in treatment remain uncertain.

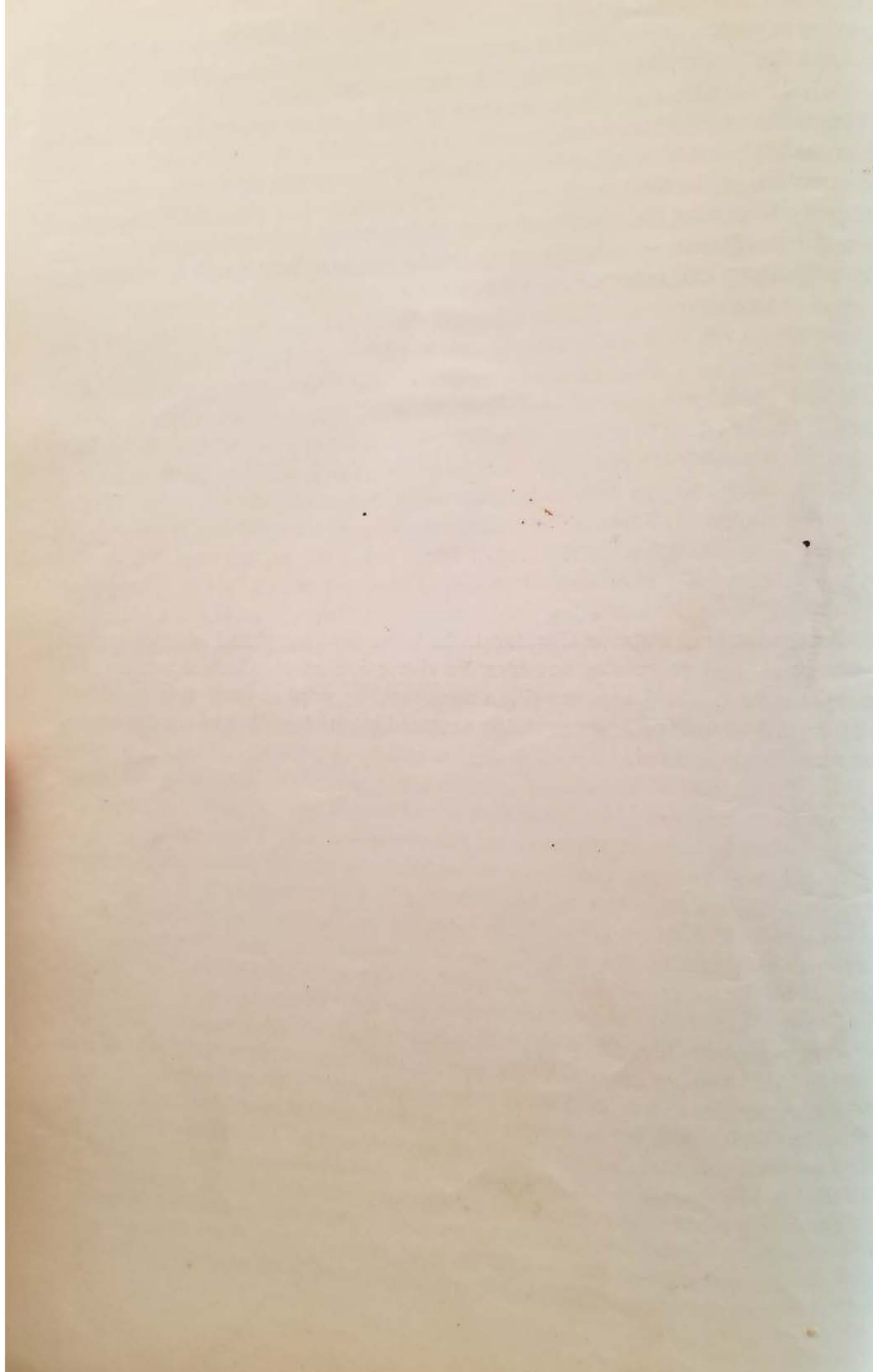
Only those who have been involved in any form of epidemiological enquiry will know the exertions required to initiate and execute a study such as this, and Dr. Gavin Andrews and Mrs. Mary Harris, who have been responsible for the organisation and execution of the field work, are to be congratulated for their skill, courage and pertinacity in gaining the co-operation of all concerned and bringing the work to a successful conclusion, — a result which would not have been possible without their great enthusiasm and energy.

Donald Court

Martin Roth

Publishers' Note

As the authors state in Chapter 1, the terms 'stuttering' and 'stammering' are synonymous, and there was considerable discussion as to which should be used throughout the book. 'Stammering' is a more familiar word to many British readers, but the word 'stuttering' is more widely accepted internationally and, on our advice, was accordingly selected.



The Diagnosis of Stuttering

Definition

STUTTERING AND STAMMERING are synonymous terms for the same speech disorder. They are descriptive of a particular symptomatology and carry no implications that the syndrome is a single homogeneous entity.

Among professional workers in the field there is often incomplete agreement as to what is meant by the term stuttering. For the purpose of this monograph we propose to define the term and then to illustrate it by description of the phenomenon and discussion of related but distinct conditions.

The following definition owes much to that proposed by Bloodstein (1958). It seeks to describe the observable speech phenomena which effectively distinguish stuttering from other abnormal speech behaviour:—

Stuttering is an interruption in the normal rhythm of speech of such frequency and abnormality as to attract attention, interfere with communication, or cause distress to a stutterer or his audience. He knows precisely what he wishes to say, but at the time is unable to say it easily because of an involuntary repetition, prolongation or cessation of sound.

The Diagnosis of Stuttering

Repetition of sound or syllable is the earliest and most fundamental symptom of stuttering and is present in almost all cases from the start of the disorder. These repetitions will be identified as stuttering by naive observers, either if they occur regularly in the speech, or if there are episodes when there is more than a single repetition on any one sound (Sander 1963). They are thus distinct from the common inaccuracies of speech. The association of tension with such repetitions is diagnostic of stuttering. Phrase and word repetitions, hesitations, interjections and corrections without tension are often present in normal speech and are not regarded as stuttering.

Prolongations of sound occur rarely in normal speech, whereas in stuttering they often form a characteristic part of the abnormality. Prolongations tend to occur on the vowels and continuous consonants when, despite considerable tension and effort, the stutterer is unable to end the extension of the sound.

Silent blocks in the smooth progress of speech occur in stuttering, usually associated with plosive consonants, or the glottal stop initiation of vowel sounds. They can appear either at the beginning or in the middle of words. They occasion considerable distress to the stutterer and strenuous efforts may be made in an attempt to end the block. In order to emphasize the tension experienced and the effort expended by one whose speech is blocked, Van Riper (1954) termed these 'hard contacts'.

A number of associated body symptoms, such as irregularities of breathing,

abnormal movements of the tongue and jaws, facial tics and movements of the trunk and limbs, frequently occur concurrently with the prolongations and blockings. These appear to be outside the voluntary control of the stutterer and end only with the cessation of the particular interruption of speech. Some stutterers can remember first using them voluntarily as a means of release from blocking and later finding them to have become part of the involuntary stuttering pattern.

In addition to these specific interruptions in the normal rhythm of speech, in more severe stutterers disturbances in the total pattern of speech are noted. As Johnson *et al.* (1961) pointed out, there is a significant reduction in total word output in free conversation so that rates of under 100 words per minute differentiate 70 per cent of stutterers from normal speakers. Wendell and Cole (1961) found that even during a stutterer's period of fluent speech, judges could effectively differentiate his speech from similar passages by non-stutterers. The stutterers generally had a poor rate of speech, demonstrating more force and strain, and had less rhythmical speech patterns than the normal speakers.

As the disorder becomes more severe, stutterers begin to avoid words that they feel to be difficult for them, and on which they have often stuttered in the past. The avoidance is usually achieved by finding synonyms which can be said without difficulty. Such circumlocutions may be effective temporarily, but when precise and accurate speech, particularly of a technical nature, is required, the synonyms fail to express the meaning and the stutterer, being misunderstood, is in greater difficulty than he would have been had he only stuttered on the original and correct word. Word avoidance, if it becomes gross, may so limit the vocabulary that speech assumes a telegraphic form.

The avoidance of words which are difficult to say is not confined to stutterers alone, for it is practised by others who have particular difficulty in the articulation of certain sounds. They too develop a repertoire of synonyms, but as their disability remains confined to relatively few words there is little handicap.

A severe stutterer frequently avoids particular speech situations that he finds difficult; he also develops a range of devices to cope with the situations should he be unable to avoid them. For example, to avoid having to ask for bus fares, he may carry an inordinate amount of small change so that the correct fare may be proffered in silence. Embarrassment and frustration are experienced by the stutterer when the disorder interferes with his ability to communicate his needs and wants. After some time he learns to anticipate particular speaking situations with anxiety and dread. To the advanced stutterer, this dread of anxiety-provoking situations intensifies all the avoidance phenomena.

Confronted by the stutter, the listener too becomes embarrassed. In an attempt to help he commonly supplies words or finishes sentences, or if the stutter is very severe he may rephrase the conversation so that all that is required from the stutterer is a nod or shake of the head. The listener may try to look away or occupy himself with something else, feigning not to notice the speech difficulty. The listener's obvious embarrassment and anxiety is a further goad to the speaker's anxiety, selfconsciousness and frustration.

The hallmark of stuttering would appear to be the unpleasant sense of tension and physical effort directly associated with an interruption in the normal flow of speech. The normal speaker is often unaware of the inaccuracies and repetitions in his speech and if the need arises can eliminate them easily. The stutterer is all too aware of his speech faults, anticipating their occurrence with anxiety, greeting their arrival with tension and effort, and failing abysmally to avoid them.

Differential Diagnosis

Differential diagnostic problems arise in distinguishing stuttering from three other conditions.

(i) *The Normal Non-fluencies of Speech*

Johnson (1955) reports the results of several studies of non-fluency in the speech of young children. The speech of his group of 2- to 5-year-old children showed a mean incidence of 4.9 instances of all types of repetition per 100 words. It is instructive to look at the detailed analysis of the incidence and types of these repetitions, particularly those from the Davis study. More than 90 per cent of the instances recorded were the repetition of a word or phrase. These were exhibited in an essentially normal fashion by all the children, no child apparently being completely free of either one or the other. Repetitions of sound and syllable constituted less than 10 per cent of the total repetitions, and were not normally distributed, but seemed to be confined to a small group of children.

Métraux (1950) came to the same conclusion when she described the developmental speech profiles of children up to the age of $4\frac{1}{2}$ years. She noticed that phrase and word repetitions were commonly used to gain attention, for emphasis, or for pleasure. Syllable repetitions were confined to a small group of children and differed from other types of repetition in that they did not diminish with maturation, and seemed to be associated with tension, the child having to make a forceful effort to finish saying the word. By the age of $4\frac{1}{2}$ years repetitions were very much rarer, and even the sound and syllable repetitions, termed by her 'developmental stuttering', were in some cases beginning to remit.

Van Riper (1954), discussing this feature in differential diagnosis, agrees that stuttering children tend to repeat sounds and syllables, whereas word and phrase repetitions are common to both groups. A stutterer has difficulty in uttering words, even when he knows what he wants to say, while the non-stuttering child hesitates mainly when he is doubtful about what he wishes to say. Johnson *et al.* (1961) showed that repetition of word and phrase remains a feature of normal adult language, but that sound and syllable repetitions are very rare. Similar results are reported in the study by Voelker (1944) when he found no syllable repetitions in the speech of 62 non-stuttering teenagers. Thus while repetitions and non-fluencies do occur in normal speech, sound and syllable repetitions are not normally distributed, being extremely rare in normal speech yet occurring characteristically in the speech of stutterers.

(ii) *Cluttering*

Cluttering is the only actual speech disorder which may give rise to diagnostic

problems. 'Cluttering speech is characterised by uncontrollable speed which results in truncated, dysrhythmic and incoherent utterance', (*Terminology for Speech Disorders*, 1959). Reports of case studies are rare in the literature (Arnold 1960), and continental workers often relate it to organic factors (Moravek and Langova 1962).

(iii) *Anxiety Neurosis*

Patients suffering from an anxiety neurosis not infrequently complain that stuttering is one of their symptoms. They do not mean that they have difficulties with particular words, or that their speech is characterised by repetitions, prolongations or blockings, but rather that they feel hesitant about speaking and are normally self-conscious about how it may sound. This is only a further manifestation of their anxiety and seems to be unrelated to the syndrome of stuttering.

Children with normal speech may state that they stutter on occasion. This would appear to be a reflection of their parents' anxious reaction to the normal non-fluencies of speech, when the child has been told to 'stop stuttering and talk properly'. But again, as with the anxiety neurotics, their speech shows none of the characteristic features of stuttering.

The Measurement of Stuttering

Having defined what is meant by the disorder, it is useful to be able to measure its severity. The Iowa scale for rating severity of stuttering (Johnson *et al.* 1963) uses a 7-point scale. Such a scale is probably too detailed for general clinical use, for not only is it difficult to use with reliability, but a significant proportion of stutterers will vary between groups from day to day. Sander (1962) studied the intercorrelations between measures of severity and suggested the possibility of using a relatively simplified method of analysis based on the counting of disfluent words and the measurement of rate of speaking.

The length of sample on which the rating is made is the next variable to be considered. A clinical rating is usually made upon an hour-long sample of speech during the initial interview or during treatment, but it is obviously too time-consuming to analyse tape-recordings in this way. Young and Prather (1962) found that quite small segments of speech are representative of complete samples. In view of this finding, the first 200 words or the first two minutes of recorded speech appear to represent an adequate sample.

For the purpose of the research work described in this monograph the following three-point rating scale was designed to offer a reliable and efficient method of measuring the phenomenon. It is similar to the Iowa Scale, but less complicated and probably more useful in general clinical work, having a high reliability when used by different workers.

A particular stutterer may be given a point on the scale by measuring the percentage of words stuttered, using a two-minute or 200-word sample of speech, and identifying **stutters** by using Sander's disfluent word criteria. In unusual cases the impairment of communication may be taken into account by measuring the word output per minute. The percentage of words stuttered and the word output per minute correlate so highly that measurement of the former is usually sufficient.

When practice in the use of this measure has been obtained it will be found that the severity of stuttering can be reliably assessed on clinical impression alone at the conclusion of an interview.

TABLE 1
Severity of Stuttering

Grade 0	Stutter not heard at interview.
Grade 1	Mild stutter. Communication unimpaired. 0-5% of words stuttered.
Grade 2	Moderate stutter. Communication slightly impaired. 6-20% of words stuttered.
Grade 3	Severe stutter. Communication definitely impaired. Over 20% of words.

It is possible to use a code to describe the symptoms that are present. As a stutter develops, simple repetitions are often succeeded by prolongations and hard blockings, and finally by associated bodily movements. It is usually sufficient to code the most advanced symptom present, for the preceding symptoms may be present to a greater or lesser extent.

Descriptive code for symptoms:

A = Simple repetitions.

B = Prolongations and hard blockings.

C = Associated facial and body movements.

Thus, by combining the grading of severity with the code for symptom description, a stutter may be described in an abbreviated form.

Present Knowledge of the Syndrome

It is a difficult and chastening task to attempt to review the existing literature on this subject. Papers about stuttering fall conveniently into three groups, which discuss in turn factors affecting its occurrence, the clinical manifestations, and the evidence for and theories concerning the aetiology of stuttering. Methods of treatment will be reviewed briefly in Chapter 8.

Factors Affecting the Prevalence of Stuttering

1. Age

Surveys of stuttering in British schools consistently report a figure in the region of 1 per cent. McAllister (1958) reports two earlier surveys, one in Scotland and one in London, both of which returned a figure of 1 per cent. Twelve years later the Scottish school area was again surveyed and the prevalence found was still in the region of 1 per cent (Wohl 1951). Further analysis of this survey revealed that the prevalence varied from 1 per cent in junior schools to 1.6 per cent in senior schools. In America similar surveys of school populations have returned figures in the region of 0.8 per cent (Snyder 1960, Barbara 1960).

There have been no reported surveys of total populations, and although the figure of 1 per cent is regularly quoted this may well be an unwarranted extension of school survey data. Such a figure may be roughly representative of the prevalence of the condition, but it does not necessarily reflect the true incidence of the disorder in the community. Morley (1957), in a sample of 1,000 children, found that before the age of 7 years 4 per cent experienced a period of stuttering, many of them remitting within a year or so. Some of these children, particularly those who had a transient episode of stuttering, may be similar to the group of developmental stutterers described by Métraux (1950).

2. Distribution of Stuttering According to Sex

At all ages there are more male than female stutterers and this predominance appears to become more marked with increasing age. Reid (1946) quotes reports of sex ratios as diverse as 2 : 1 and 10 : 1. A survey of a school population by McDowell (1928) returned a ratio of males to females as 2.9 : 1, and a similar result was obtained by Schindler (Johnson 1955) from a study of an elementary school system. Brown (1932) found the sex ratio in older stutterers to be 4 : 1, and studies by Morley (1952) based on those attending her clinic found a similar ratio of 4.3:1.

There are two theories which seek to explain this puzzling sex ratio. The first, suggested by West *et al.* (1939), considered that girls have a greater resistance to the hereditary predisposing factors which appear to contribute to the development of stuttering. The second theory (Mills and Streit 1942) suggests that, even though boys are slower in their speech development than girls in our society there is considerably

more pressure upon them to attain fluent speech. Their relative inability to achieve this results in anxiety and this is supposed to precipitate the stutter.

3. *The Intelligence of Stutterers*

It has commonly been assumed that stutterers are either normal or slightly above normal in intelligence. Travis (1959) presents an I.Q. distribution of 73 public school stutterers which was significantly above normal. He also reports that stutterers in the University of Iowa have been distinctly superior to the average college student in intelligence, but wisely attributes this to a selective factor which might keep the less intelligent stutterers from attempting college. There is now increasing evidence to show that, even if stutterers presenting for treatment in clinics tend to be of normal or above normal intelligence, stuttering is positively correlated with mild degrees of intellectual handicap.

Schindler (Johnson 1955) reports a survey using the Otis intelligence test in a school system. She found the stutterers had a slightly lower I.Q. than the non-stutterers. She attributed the difference to the technical difficulty in applying verbal intelligence tests to stutterers. Loutit and Halls (1936) described 3.22 per cent of educationally subnormal children as stuttering compared to the 0.77 per cent of stutterers in his total school population. Wohl (1951) found that the prevalence of stuttering in special schools among the educable mentally and physically handicapped children was some four times that in normal schools. Stark (1963), in a survey of educationally subnormal children in Glasgow, found the incidence of stuttering to be 10 per cent, while Ingram (1963), in a survey of children with cerebral diplegia, found the incidence of stuttering to be 15 per cent.

Schlanger and Cottsleben (1957) analysed the speech of 516 institutionalised mentally retarded children with a mean I.Q. of about 50, and found the incidence of stuttering to be 17 per cent. It was particularly frequent in those children with known brain damage or with mongolism.

Thus the prevalence of stuttering appears to be greater among groups of children of low intelligence, whether this be due to sub-cultural variance or organic brain damage.

It is difficult to say whether stuttering is really more frequent among those of high intelligence as well as among the dull, as clinical experience seems to indicate. Effective fluent speech is more essential in the work and play of the intelligent and thus the communication handicap caused by a stutter is correspondingly greater. The motivation for such people to seek treatment is stronger, and in our society this is complemented by the ready availability of treatment for the able. Perhaps these two factors are sufficient to explain the frequent appearance of able stutterers in the clinic.

4. *Laterality and Stuttering*

Thirty years ago stuttering was believed by Travis *et al.* to be related to incomplete cerebral dominance. Experiments at the time (Bryngleson 1940, Johnson and Duke 1935), indicated that there appeared to be a causal relationship between ambidexterity, change of handedness and stuttering. With the advent of more systematic work amongst larger population samples no essential relationship between handedness,

ambidexterity or change of handedness and stuttering could be demonstrated (Heltman 1940, Clarke 1953, Spandino 1941).

5. *Distribution by Social Class*

In much of the literature on stutterers, those described have been of superior socio-economic status (Johnson 1955/59), presumably because of their ready availability to University clinic research programmes.

Population surveys have either neglected this facet, or if they have attempted to define this parameter (Schindler 1955) they have obtained such scanty data as to make the results questionable.

In a survey in Scotland, Morgenstern (1953) reported that the incidence was as expected amongst the upper and middle social classes, but was significantly higher in the families of semi-skilled weekly wage earners, a group which corresponds closely to social class IV of the Registrar General's Classification used in this monograph. In the last social group in his material the frequency of stuttering was significantly lower. This is not as surprising as it appears because the group contained unskilled workers as well as agricultural employers, managers, and farmers, and was thus not comparable with social class V of the British classification for it embraced upper, middle and lower class elements. Morgenstern commented that stuttering may be related to upward social mobility, a proposition that may well be true in some cases, although it is scarcely justified by the results of his survey.

6. *Environment and Stuttering*

Stuttering occurs in diverse cultural settings. Its prevalence in Western Europe is approximately 1 per cent. Similar results have been obtained from surveys in India, America, Ghana, and with Bantu children in Johannesburg (Aron 1962). Information is available about stuttering in many other cultures, but it is mainly based on hearsay and not on formal prevalence studies.

Stewart (1960), in his detailed monograph, suggested that stuttering is unknown in the Colorado Utah Indians. He related this to permissive child-rearing practices and resulting tolerance of non-optimal verbal skills. Unfortunately the significance of his work is somewhat limited because in his criteria for diagnosis he included, as three essentials, the speaker's non-fluency, the culture's sensitivity and unfavourable reaction to such speech, and the speaker's consequent sensitivity and concern. Thus, one who stuttered but who was unconcerned about it would hardly be considered a stutterer. It is not surprising therefore that in a permissive culture Stewart found a low incidence of people concerned about stuttering.

Within any particular culture certain aspects of the home environment, physical and emotional, might well affect the incidence of stuttering. There is little published work about the former but the latter has received much attention. Moncur (1951) examined 48 pairs of stutterers and control children from a school system and asked the mothers a series of questions about the child and the home. He found the stutterers' home environment to be significantly adverse. The parents of stutterers appeared to dominate, over-supervise, demand high standards and unduly criticise their children. Among these families he found greater evidence of parental friction and unhappy home conditions.

A monumental work by Johnson (1959) is concerned with a similar study of 250 pairs of children. These children were taken from referrals to the university speech clinics and thus formed a highly selected group. Nevertheless, the excellent methodology makes this an impressive study, if it is borne in mind that a special group of stutterers has been dealt with. He found that although the parents of stutterers were reasonably stable and well adjusted they tended to be more dissatisfied with their children, with each other, and with their circumstances. They had high standards of child rearing and seemed to be more perfectionist and striving than the parents in the control group. Although these findings and their particular relation to the development of stuttering form a corner-stone in Johnson's theory, it seems to the authors that these are just the factors which would lead parents of stutterers to seek the best treatment, and may in part be a sampling effect. Nevertheless, the agreement with Moncur's work is encouraging.

The Clinical Manifestations of Stuttering

1. The Development of Speech in Stutterers

The development of speech tends to be delayed in stutterers, and when they do begin to speak there appears to be an increased incidence of articulatory defect. Morley (1957), reporting the speech development of a population sample of 1,000 children, found that stutterers, as a group, were some three months delayed in the use of first words, five months delayed in the use of first phrases, and nearly a year delayed in the attainment of intelligible speech. There was also some handicap in the development of language ability amongst the stuttering group.

Similar results have been reported by Berry and Eisenson (1956) in a developmental study of 500 stutterer and control pairs of children. The stutterers showed a retardation both in the onset and the development of intelligible speech of the same degree as Morley's group.

Delayed development of speech is apparently determined by many factors. Low intelligence, hearing loss, developmental speech delay, and emotional disorder are common antecedents. Occasionally the development of a private non-verbal language between mother and child may result in the delayed onset of speech, for here there is a reduced need for verbal communication (Morley 1957).

Gardiner (*cit.* Levin 1962) divides the causes of the delayed onset of speech into a functional group due to psychiatric disorders, and an organic group due to mental retardation with or without brain damage. Similar factors seem to contribute to articulatory disorders in children.

2. The Onset of Stuttering

Stuttering is a disorder of childhood. Morley (1957), in a review of 400 clinic cases, found that 50 per cent had begun to stutter before the age of 5 years, 90 per cent before the age of 8 years, and 99 per cent before the age of 13 years. Other workers seem to be essentially in agreement with her finding (Snyder 1960, Barbara 1960).

There has been some speculation as to what actually precipitates the stuttering. Orton related it to learning to talk and to read. Barbara (1960) related it to a traumatic experience in emotionally predisposed children. Morley (1957) relates the onset to

illness, injury, shock, or other factors leading to speech consciousness and speech correction.

Johnson (1959) made an important attempt to define the circumstances surrounding the onset of stuttering. Within his clinic group of young children who had recently begun to stutter, he found no significant precipitating factors other than the negative evaluation of the child's non-fluencies by the parents and the identification of these as stuttering. He postulated that when the child becomes aware and concerned about the imperfections of his speech, further disruption of verbal fluency occurs. Thus for Johnson the problem of the onset of stuttering is not so much a matter of something happening to the stutterer, but rather an interaction of events between the child and his parent, giving rise to anxiety about the adequacy of speech.

Those cases in whom stuttering begins in adolescence or adulthood form an interesting sub-group. Some adult males began stuttering while on active service during World War I (Kingdon-Ward 1941) and World War II (Peacher and Harris 1946). The precipitating cause was considered to be emotional stress; interestingly the prognosis in these cases was good. Whether this was stuttering arising *de novo*, or a reactivation of a childhood stutter that had remitted, is not known.

Stuttering may certainly arise in later life as an apparent sequela of dysphasia associated with strokes (Arend *et al.* 1962). Such cases of late onset are relatively rare and probably constitute less than 1 per cent of the total.

3. The Symptoms of Stuttering

The disorder seems to develop on predictable lines regarding both the complexity and severity of its manifestations. Bloodstein (1960*a*, 1960*b*, 1961) has given an excellent description of the symptoms of stuttering with particular reference to their chronological development. He analysed 418 case records of children between the ages of 2 and 16 years seen at his clinic. In paraphrasing his account, exceptions (which are fully discussed in the original text) will be ignored in the interests of brevity. He describes the symptomatology of stuttering under the following headings:

(i) *Repetitions*. Repetitions occurred at every age level in his material but were the dominant feature until 6 or 7. They were more frequent and more prolonged than normal non-fluencies and were often associated with a degree of stress. Repeated difficulty with specific sounds (the consistency effect) was evident even in the youngest children. In the earliest cases, as well as the repetition of sound and syllable, there was frequently repetition of the monosyllabic words at the beginning of a phrase or sentence. This feature was not seen in the older stutterer where the syllable repetitions that remained were confined to the major words.

(ii) *Hard contacts and prolongations*. Hard contacts and prolongations are the characteristic symptoms of stuttering. They appeared, associated with considerable strain, in even the youngest children. In a few cases it seemed that they were the first symptoms of stuttering, although it was possible that the repetitions had been overlooked and the stutter diagnosed only when the more markedly abnormal symptoms became prominent. In the majority of cases the hard contacts and prolongations became obvious after a period in which repetition was the only symptom.

These symptoms—repetitions, hard contacts and prolongations—form the

primary speech disturbances in stuttering. The secondary symptoms can be grouped into the following categories.

(iii) *Associated motor symptoms.* Associated motor symptoms appeared concomitantly with the speech difficulty. The percentage manifesting these rose steadily with age, reaching 70 per cent in the oldest group of stutterers. Breathing irregularities and head and facial movements were common, whereas movements of the hands and feet or total body movements were unusual. About 10 per cent of his subjects interjected extraneous sounds, words or phrases.

Associated motor symptoms function initially as devices to start a difficult word, to delay having to say it or as a release when the stutterer is caught in a difficult word. This last function of the associated symptom is very common and occurs even in moderate cases.

(iv) *Fluent periods.* In pre-school children remissions of good quality and length appeared to be quite common, but with increasing age such fluent periods diminished until, in the adolescent group, they were completely absent. Some of these remissions might well have been permanent, so that cases of established stuttering could stem from a much larger reservoir of transient stuttering in early childhood. Exacerbations were at the end of these fluent periods. They came on gradually and there was no apparent cause.

(v) *Anticipation and consistency.* Anticipation refers to the stutterer's ability to foretell difficulty with a word before he reaches it—that is, he expects to stutter on it before actually attempting it. Bloodstein found it was difficult to enquire about this from the younger children, but a high proportion of his older children agreed that this occurred. That is, they regularly anticipated difficulty with words on which they would later stutter.

The consistency effect refers to a tendency for stuttering to occur on the same words in successive readings of the same passage. In other words, stuttering seems to be a response to certain features of the speech sequence. Bloodstein found that every stutterer, even the youngest child, exhibited this phenomenon in some degree. In the older children it was tested by repeated readings of the same material. In the younger children, who could not read, it was tested by asking them to repeat standard sentences. Thus, while many younger stutterers apparently had no conscious expectation of stuttering on certain words, in the light of the consistency phenomenon certain words did appear to form significant cues which were reacted to in advance. This, according to Bloodstein, is evidence of anticipation on an unconscious level.

Conscious anticipation, or dread of stuttering, is present in the majority of adult stutterers and is one of the most unpleasant subjective aspects of the syndrome. When anticipation is well developed stutterers can define accurately the parts of their vocabulary which they can say with ease and those which they are reluctant to use.

(vi) *Word substitution.* The avoidance of difficult words by circumlocution and substitution of synonyms was more frequent in his older children, becoming one of the principal secondary features of the disorder. In younger children avoidance was rare.

4. *The Development of the Severe Syndrome*

On the basis of the growth of the symptom pattern with age, Bloodstein subdivided the development of stuttering into a number of phases. He stressed that many stutterers did not progress uniformly through all the phases, and that the severe phases could sometimes be seen in quite young subjects. He meant these phases to be regarded as reference points on a continuum to which individual cases could be related.

Phase I is seen typically in the pre-school and infant school child when the predominant speech symptom is a repetition of sound and syllable and of small words initiating phrases. Prolongations and blockings are seen, and although they may be quite severe in some, they are not common. The essential feature of this phase is that the disorder is episodic with long periods of complete remissions. The speech is worse when the child is in situations of communicative stress. There are few associated symptoms and few secondary manifestations of stuttering.

Phase II usually occurs in the junior school child when the disorder has become chronic. The speech symptoms remain very much the same, with repetitions, prolongations and blockings. The hard contacts and blockings have become much more prevalent and the associated body symptoms are beginning to appear. The child accepts himself as a stutterer and, although he may substitute for difficult words, there is no actual avoidance of speech nor is he embarrassed about his difficulty.

Phase III—in this phase the speech symptoms have continued to develop. The hard contacts and blockings are now quite common, and the repetitions a much less significant part of the disability. This phase is characterised by the elaboration of the secondary symptoms, such as word and sound difficulties, word substitution, and situational difficulties. There is still very little outright avoidance of speaking and little emotional reaction to the disability, so that the stutterer continues to talk freely despite the severity of the actual speech handicap.

Phase IV is the fully developed pattern of stuttering in adolescence and adulthood. It has evolved into a serious personal problem which is characterised by an emotional reaction to the continuing severity of the speech disorder. There are now vivid anticipations of difficulties with particular words and particular situations. Word substitution is common and may become disabling. Avoidance of difficult speaking situations is also common and soon limits the stutterer's ability to live normally. Fear of stuttering, and embarrassment or shame when it occurs, may lead to disabling worry and anxiety. Soon the stutterer is seldom free of a preoccupation with his speech and the world becomes a battle ground on which he is constantly defeated.

Bloodstein's material included children and adolescents only, but a fifth phase can be distinguished in many adult stutterers. As the stutterer attains maturity the world becomes essentially less anxiety-provoking than it was in adolescence. In adulthood some stutterers appear to reach a period of relative equilibrium with their speech disorder. No longer are situation-avoidances disabling or common. No longer do word-avoidances make for confusion, but rather they control the symptom. Whether it be due to this or to a true remission, during the third and fourth decade

many stutterers appear to experience a rewarding modification of their symptoms.

5. *Factors Modifying the Stutter*

(i) *Conditions under which stuttering is reduced or increased.* Bloodstein (1949, 1950) reviewed the literature on these conditions and then extended and elaborated the findings by interview and questionnaire techniques with stutterers. He found that the conditions under which the severity of the symptoms was reduced could be sub-divided into the following groups:—

- (a) Situations in which there is reduced communicative responsibility; for example, acting a rôle, speaking to an animal or child, talking with no-one present, or making an inconsequential remark.
- (b) Conditions in which there is minimal negative reaction to the stuttering by the listener, such as speaking to one's spouse or children, who are used to, and unconcerned about, the stuttering.
- (c) Experience of a change in the speech pattern. Changes in the rhythm pattern are extremely effective, especially singing, speaking in a sing-song voice, speaking in time to a metronome, or reading in unison when the reading of the others acts as a pacemaker. Other changes in voice quality or intonation will also reduce the severity of stuttering quite markedly. Speaking as an accompaniment to rhythmic activity will also reduce the frequency of the stutter.
- (d) Stuttering is reduced under conditions of unusual stimulation; in acute fear or anger, after the taking of some drugs, or during a loud noise when the stutterer cannot hear the sound of his own voice. Stuttering can be reduced by strong suggestion. Hypnotic suggestion may produce a striking temporary improvement in stuttering and even strong persuasion from some therapists may be effective.

Since these are the conditions in which stuttering is reduced or absent, it is not surprising that in the converse of these situations stuttering will tend to be increased. There is, in addition, an interesting experimental situation that increases the severity of stuttering. If a subject is penalised for each stutter by being given an electric shock immediately following it, the stutter worsens. In control situations, with a shock being given for each stutter made in a prior reading of the same material, regardless of the speech in the test reading, there was no increase in stutter (Van Riper 1937). In the first situation the shock intensifies the anxiety-motivated avoidance activity which is part of the stutter; in the second situation it is independent of the locus of stuttering and hence has no effect upon its severity.

From this review of conditions which increase or decrease stuttering it becomes obvious that the severity of stuttering is a correlate of the need to avoid stuttering. Thus when fluent speech is desirable the stutter will be bad and when non-essential it will be minimal.

(ii) *Stuttering in relation to various speech sounds.* The actual cue words which evoke a stuttering response remain an individual matter. Brown (Johnson 1955), making a series of studies on the relative importance of words, found that 95 per cent of stutters could be accounted for by four features of the speech sequence—the sound

itself, and the length, position and function of the word. Recent work (Sodenberg 1962, Quarrington *et al.* 1962) has raised some doubts about the significance of consonants compared with vowels, and of the distribution of stuttering amongst words according to their grammatical function. It can be said that the words most likely to be stuttered on are the long, more meaningful, stressed words at the beginning of a sentence.

(iii) *The adaptation effect.* Adaptation describes the progressive decrease in the frequency of stuttering that occurs with repeated reading of the same material. The largest decrease in stutters occurs between the first and second readings, and by the fifth consecutive reading there will usually have been a 50 per cent reduction of the initial frequency. Each further reading of the material gives an additional reduction in severity. With each trial, however, the decrease in severity grows progressively less.

If changing verbal material is used, the reduction of stuttering at the end of five consecutive readings will be only about 10 per cent. If the size of the audience is increased or the nature of the reading situation disturbed, the adaptation obtained will be less than in the pure reading condition. The adaptation effect is decreased when the interval between successive readings is extended (Johnson 1955). Newman (1954) found that adaptation occurs in repeated spontaneous descriptions (free speech) of an object, although the adaptation is slower than in reading and does not begin until between the second and third trials.

Spontaneous reversal of this adaptation occurs within 24 hours and may occasionally be complete within 5 hours of the last trial (Johnson 1955). The variations in recovery and adaptation with various time intervals have been explored in detail by Leutenegger (1957). He commented that adaptation could be viewed as analogous to experimental extinction in terms of Hullian learning theory.

Brutten (1963) investigated the changing level of anxiety during adaptation by measuring palmar sweat prints. He found that the decrease in anxiety, as measured by the palmar sweat technique, paralleled the concurrent curve of adaptation of the stutter. Viewing his results in terms of Hullian theory he wrote that 'adaptation resulted from a reduction in the effective reaction potential because of an increment in inhibitory potentials and a reduction in avoidance drive level.'

(iv) *The consistency effect.* The consistency effect is the tendency for stuttering to occur repeatedly in response to the same cues and stimuli. Usually this is taken to mean stuttering on the same words in repeated readings of the same material, although other types of cues and stimuli have been explored (Johnson 1955). The usual measure of consistency is to find the percentage of words stuttered in a given reading which were also stuttered in a previous reading. It is usual to find between 60 and 70 per cent of the stutterings consistent from one reading to the other.

The consistency effect can be demonstrated when the interval between serial readings is as long as six weeks. It can also be demonstrated by asking a subject to mark the words on which he would expect to stutter if he were reading aloud and then testing this by asking him to read the passage at a later date.

According to Bloodstein (1960) the significance of the consistency effect is that

it demonstrates stuttering to be, in part, a response to certain features of the speech sequence. For him, the presence of consistency in stuttering implies anticipation of the likelihood of stuttering. Consistency behaviour correlates highly with severity, even when the effect of the increased frequency of the stutters is allowed for. Johnson *et al.* (1963) suggest that the consistency measure may indicate how strongly a stutterer's responses are conditioned to particular stimuli.

(v) Delayed auditory feed-back. Lee (1951) drew attention to the fact that if the perception of speech was artificially delayed by 0.1 sec. some normal-speaking subjects would have difficulty in maintaining fluent speech. Their rate decreases, their intelligibility suffers, and they manifest disturbances in articulation which are superficially similar to stuttering.

This work was confirmed and extended by Cherry *et al.* (1956). Much speculation has occurred as to its relationship with the syndrome of stuttering. Cherry suggested that stuttering represents a type of 'relax oscillation' caused by an instability of the auditory feed-back loop. He attempted to confirm this hypothesis by using a loud masking tone to interfere with auditory feed-back, and found an immediate and striking reduction in stuttering. He then attempted to interfere with auditory perception by compelling transference of the speaker's attention to another's speech, using the technique of shadowing. Again there was a reduction in the severity of stuttering in all subjects. The conclusion drawn was that masking by side tone or by altering perception by the use of shadowing might be therapeutically advantageous. Although the clinical technique was carried out, no follow-up studies have been published.

In a further study on the use of a masking tone, Maraist and Hutton (1957) concluded that in stutterers both the rate of speaking and severity of stuttering improves with the increasing intensity of masking noise, and that the clinical use of such a method might be feasible. Fry (1963) considered that it was significant that delayed auditory feed-back has its maximum effect on most speakers when the delay is a little less than the average duration of a syllable.

More definitive work on the status of delayed auditory feed-back and stuttering is reported by Neelley (1961). He compared the speech of stutterers and non-stutterers under normal auditory feed-back and delayed auditory feed-back. The speech of both groups under delayed auditory feed-back showed little adaptation or consistency and so differed greatly from the speech of the stutterers under conditions of normal auditory feed-back. Judges were able to differentiate stutterers reading under normal auditory feed-back from either group reading under delayed auditory feed-back. Thus the phenomenon that occurs under delayed auditory feed-back is clinically and experimentally distinguishable from normal stuttering.

The stutterers themselves reported that the experience of speaking under normal auditory feed-back and stuttering normally was quite distinct from speaking under delayed auditory feed-back and stuttering artificially. Neelley concluded that there are substantial differences between stuttering on one hand and speech under delayed auditory feed-back on the other and finds little support for the theory that stuttering may be directly related to this phenomenon.

6. Outcome and Prognosis

There is surprisingly little information about the natural history of stuttering or about the prognosis in various age groups. As indicated by Bloodstein, spontaneous remission is common in the young stutterer before the age of 6 or 7. This was confirmed by Morley (1957) who found that three-quarters of children who stuttered before this age remitted spontaneously. Similar figures are quoted by Johnson (1955) who saw young stutterers and advised their parents. Two-and-a-half years later at follow-up more than 50 per cent were reported as no longer having a speech problem. There is no available information about the prognosis and outcome in older children, adolescents or adults.

The Aetiology of Stuttering

There are a multitude of theories about the origin of stuttering (Hahn 1943, Eisenson 1958). Some are carefully-constructed attempts to relate the known aspects of the disorder, and are themselves in turn capable of experimental verification. Many, unfortunately, seem to be mere expressions of opinion, often unrelated to the features of the syndrome and impossible to test experimentally.

It is convenient to discuss the concepts of aetiology under three main headings. Firstly, that the stutterer suffers from a constitutional difference in his central nervous system. Secondly, that stuttering is a symptom of a psychoneurosis. Either the stutter functions as an ego defence mechanism to reduce anxiety, or it is the consequence of neurotic anxiety and a further symptom of emotional disturbance. Thirdly, that the stutterer is neither constitutionally nor psychiatrically different from the non-stutterer, but because of particular environmental and cultural experiences the stutter has evolved as a learned response.

A similar grouping of the theories of aetiology was first proposed by Ainsworth (1945), and since then his ideas have proved extremely valuable as succeeding workers realise that the cause of stuttering is not likely to be always one and no other, but rather the result of a complex interrelationship between many factors. For the purposes of the ensuing discussion, however, it will be profitable to retain the tripartite arrangement.

1. Stuttering as the Result of Constitutional or Neurological Difference

Mac Keith and Bax (1962) brought together those phenomena occurring in children which are thought to be the result of minimal structural change in the central nervous system. They excluded the gross neurological symptoms and signs which accompany recognised syndromes, but felt that there was a group of conditions in which 'Minimal Cerebral Dysfunction' played an aetiological role. It is convenient to use their scheme, which reviews the evidence from history, symptoms, signs, and the results of special investigations, to consider whether or not stutterers resemble the neurologically abnormal.

It seems unlikely that there is a very high correlation between birth injury and stuttering. Johnson (1959) in his investigation found no significant difference between the perinatal circumstances of stutterers and those of control children. This study, though admirable in many ways, drew its children from stable, intact middle-class

families specifically without defective children. Boland (1951) has suggested that there is a relationship between instrumental delivery and stuttering, but because of his method of collecting information it is difficult to assess the reliability of his findings.

There is some evidence that stuttering may follow neurological illness. Berry (1932), in a study of the hospital records of 500 children, found an increase in the incidence of encephalitis or epilepsy amongst stutterers before the onset of their stutter. This was a retrospective study and the result may have been biased by the sampling technique. Unfortunately this work has not been repeated by other workers. There are well-substantiated reports of the onset of stuttering in adults following neurological disease which has resulted in dysphasia.

In an earlier section attention was drawn to the strong evidence that stutterers are significantly handicapped in the development of normal speech and articulation. Late and poor talking can be due to environmental and emotional factors, but they are also often associated with mental defect or other neurological abnormality.

Poor motor co-ordination and clumsiness have been found to occur in association with neurological abnormality. A series of papers were published by Diehl (1958) concerning tests of rhythmic ability, motor co-ordination and perseveration. From none of these papers can it be concluded with certainty that stutterers show evidence of motor abnormalities.

Minor perceptual abnormalities may be a sign of neurological defect. The work on delayed auditory feed-back, which was discussed earlier, has given rise to the suggestion that stutterers may have some perceptual abnormality in the auditory monitoring of their own speech. In support of this concept there is evidence that, when the monitoring of their own speech is blocked by a loud masking tone, there is a dramatic reduction in the stuttering. It is also interesting that stuttering has been reported as negligible amongst the totally deaf (Harms and Malone 1939). At the best this is indirect evidence of a perceptual abnormality and can only be regarded as an interesting but unproven hypothesis.

Increase in the incidence of left-handedness or ambidexterity, and of right-left confusion in perceptual testing, has been shown to correlate with neurological abnormality. It has been demonstrated elsewhere that the handedness of stutterers has not been proved to vary from that of non-stutterers. Concepts of ambilaterality become a more complex problem when they are extended to include Jasper and Raney's (1935) work with the Phi Test, or E.E.G. studies such as those of Douglass (1943). Such studies seem to suggest that some stutterers may have difficulties in this area, but the results of these observations cannot yet be considered adequately validated.

Intelligence is a product of the influence of organic and environmental factors upon the original constitutional endowment. Thus one of the effects of neurological abnormality is liable to be a diminution in intelligence. At present there is limited but consistent evidence to suggest that cases of stuttering are more frequent amongst those with poor intellectual endowment. In those who are educationally sub-normal, or have cerebral palsy or mental retardation secondary to other organic brain

disease, the incidence of stuttering is greatly increased. Therefore, in any large sample of stutterers, even though there are members of high intellectual ability, the average intelligence of the group will tend to be below normal. The strong association between stuttering and known CNS pathology giving rise to mental defect, which was reported earlier, is a convincing pointer towards the importance of neurological factors in some cases of stuttering.

While early workers (Travis *et al.* 1937) seemed to suggest that the electroencephalogram might be a promising method of investigating stuttering, more recent workers have considered that the incidence of abnormality in the E.E.G.s of stutterers is no greater than that occurring amongst the normal population (Rheinberger *et al.* 1943, Moravek and Langova 1962).

Douglass (1943) reported that there were differences in the percent time alpha activity between the right and left hemispheres; the mean percent time alpha in the left hemisphere exceeded that of the right in the stuttering group, but not in the control group. This study was confirmed by Knott *et al.* (1943, 1959) and it was originally felt to be confirmatory evidence for the lateral dominance theory of stuttering, but with the decline of this theory its current significance is uncertain.

There is considerable evidence that stuttering occurs commonly in certain families and that the frequency of its occurrence is related not to the common environment or child rearing practices so much as to the common genetic endowment of that family. This important aspect of stuttering will be fully discussed in Chapter 8. Theories on the constitutional predisposition to stutter must of course take account of this genetic factor.

Current theories on the organic origin of stuttering. In the 1930s Travis *et al.* propounded a detailed theory of the origin of stuttering that attracted considerable interest. In view of the laterality problems that were thought to be common in stutterers, it was suggested that, having incomplete cerebral dominance, they would be handicapped in organising complex activities such as reading, writing and speaking. Furthermore, as speech involved the bilateral co-ordination of midline musculature, their handicap would be manifest in the inco-ordination of stuttering. As early as 1940, however, Travis had already abandoned this theory and had come to consider stuttering a psychoneurotic disorder. Since then no adequate organic theory has been proposed.

West (Eisenson 1958) has postulated that stuttering is a variant of epilepsy. He cites, as evidence for the organic cause, its insidious onset and regular course, the unequal distribution between sexes, the relationship to twinning and positive family history, and the delay in the onset of speech. He feels that the spasms of stuttering are similar to those occurring in some varieties of epilepsy and he argues that stuttering may be a form of epilepsy. While his reasons for considering it organically based may be sound there is no evidence to support the proposed relationship to epilepsy.

Eisenson (1958) suggests that there is a relationship between stuttering and perseverative behaviour. The latter is considered as organically induced in the majority and a response to environment in a minority, and the repetition of the stutter is

considered a type of perseverative behaviour. He cites as empiric support of his theory a series of experiments designed to show that stutterers are more perseverative than non-stutterers (Eisenson 1958, King 1961). More recent work by Martin (1962) has failed to substantiate these findings.

Greater interest in aetiology has followed the work on delayed auditory feed-back and the attractive suggestion by Cherry et al. (1956) that stuttering may be related to an instability of the auditory feed-back loop. This work has been extended by Woolf and Woolf (1959), who proposed a model in which stuttering is represented as the result of the variable introduction of time lags in the feed-back path of normal auditory monitoring.

Neurological theories for the origin of stuttering are considered important by European workers and some views on cerebral localisation are reviewed by Moravsek and Langova (1962).

At the present time there is no theory which adequately explains the phenomenon of stuttering as a response to structural change in the central nervous system. Nevertheless, much of the information about the syndrome is consistent with an explanation in organic terms.

conc.

2. Stuttering as a Manifestation of Psychoneurosis

The proponents of theories belonging to the second group consider that stutterers are psychoneurotic, that they have experienced distortion or delay in their personality development and that the stutter is a manifestation of anxiety due to the underlying neurotic conflict.

It will be convenient first to look at studies of neurotic traits and personality in stutterers, and then to review the various theories.

The personality of stutterers. There have been numerous attempts to compare the personality characteristics of stutterers with those of non-stutterers. None is particularly satisfactory and none is very recent. Goodstein (1958) has written a comprehensive review of the literature on the subject.

Bender (1942) made a detailed study of 250 pairs of college students. He found that stutterers differed significantly in ratings on the Bernreuter Personality Inventory. They considered themselves to be nervous, tense and self-conscious, and especially so in speech situations. Furthermore they tended to be uncommunicative and dependent on others. Richardson (1944) studied 30 pairs of adult stutterers with the 'STDCR Inventory', the Rorschach and the Thematic Apperception Test. The STDCR results suggested that they were significantly socially introverted and less happy-go-lucky than the non-stutterers. The Rorschach results showed similar results and the results on the TAT revealed no differences.

Meltzer (1944) compared 50 pairs of 12-year-old stutterers and control children using the Rorschach. Differences suggested that stuttering children tend to have more 'creative ability, fantasy withdrawal, adaptability to outer reality, irritability and manic trend', than do non-stuttering children.

Bloodstein and Schrabner (1957) used the TAT to search for obsessive-compulsive traits amongst matched pairs of stutterers and controls and found no significant differences between the two groups. Quarrington (1953), using the Rosenweig's Picture

Frustration Test in 30 adult stutterers, found no significant differences from the normals.

A series of studies using the Minnesota Multiphasic Personality Inventory are reviewed by Goodstein (1958) as showing stutterers to have an elevated test profile, which, although well within the normal range, resembles that of other college students with adjustment problems.

Sheehan (1958) has collected 20 studies in which the Rorschach, TAT, or Rosenweig PF Test have been used on stutterers and controls. He concludes that stutterers do not differ from non-stutterers in their personality traits as revealed by these tests. He therefore concluded that theories of aetiology which describe personality differences have as yet no experimental support.

Sheehan's comment would appear an apt summary of the present state of knowledge. The differences that are described by Bender, Meltzer, Goodstein and Richardson seem more intelligible when viewed not as a description of fundamental personality abnormality, but rather as a reaction to the communication handicap of stuttering.

✓✓ Studies of the personalities of school children tend to be better, possibly because they are more accessible to investigators. One of the first broad surveys of stutterers to be done was that by McDowell in 1928, when, after seeing 61 pairs of children matched for age, intelligence and sex, she concluded that there was a surprising amount of similarity between the two groups in school achievement, in emotional adjustment, and in physical traits. In 1946 however, Despert discovered a veritable Pandora's Box of physical and mental ills amongst 50 stuttering children. Unfortunately the results are difficult to assess because of the lack both of adequate sampling and of a control group.

Similar problems arise in the work of Glasner (1949). He reviewed the case histories of 70 stuttering children under the age of 5 seen in the clinic, and decided that 50 per cent manifested feeding problems, 25 per cent were enuretic and 20 per cent had nightmares or other nocturnal fears, and that other manifestations of emotional disturbances were present in many of the children. He felt it profitable to divide the children into three groups: (1). Basically emotionally healthy children, in whom the stuttering began following illness or accident which gave rise to anxiety. (2). Sensitive, anxious children who had begun to stutter in response to environmental or parental pressure. (3). The severely maladjusted child whose stuttering was yet another indication of the emotional illness. He does not mention his criteria for diagnosis nor does he give the distribution of cases amongst these three groups.

Moncur (1955) made an elegant study of 48 pairs of school children with a mean age of 6½ years. He completed an inventory of symptoms of behaviour disorder supplied by the mothers and found that the stuttering children had twice as many symptoms of emotional disturbance as did the control children. The mothers of stutterers regarded their children as being more nervous, more enuretic, more prone to nightmares and night terrors, more likely to display aggressive behaviour, having more feeding problems and being more in need of discipline than did the mothers of the

control children. Although some of these judgments may reflect the personalities of the mothers (Moncur 1951), it seems that in many features, especially the psychobiological behaviour disturbances of enuresis, nightmares, and feeding difficulties, true differences were noted.

Dosuzkof (1962) has drawn further attention to the incidence of sphincter control disturbance among stuttering children. He found, when comparing 350 pairs of cases, that the stutterers were some six months late in obtaining bladder control, and that pathological continuation of enuresis occurred in a significantly greater proportion. He found a similar delay of six months in the acquisition of bowel control and again noted a small increase of encopresis amongst the stuttering children. While enuresis and encopresis are usually evidence of emotional disturbance, a mean delay of six months in the acquisition of control is comparable with the stutterer's delay in the acquisition of speech and may be evidence of delayed central nervous system maturation or the expression of mild intellectual handicap.

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Theories which regard stuttering as a symptom of psychoneurotic conflict. Fenichel's (1945) psycho-analytical formulation of stuttering considers it to be a pre-genital conversion neurosis. Although the symptom itself is a conversion phenomenon the unconscious impulses expressed in the symptom are pre-genital 'for the stutterer, having regressed to the anal sadistic level of psycho-sexual development, has personality dynamics identical to those of the compulsion neurotic'.

The symptom of stuttering arises as a result of this intrapsychic conflict, for by stuttering, the patient shows he wishes to say something, yet does not wish to. Since he consciously intends to speak he must have some unconscious reason for not wishing to speak. This is necessarily due to some unconscious significance either of speaking of particular things or of the activity of speech in general. In stutterers the function of speech means, firstly, the possibility of utterance of forbidden anal material, and secondly, the possibility of using words primitively as instruments of aggression. To stutter controls both these dangers. The stutter converts speech into a permissible anal-erotic expulsion and retention of words which at the same time controls the dangerous expression of hostility.

Stein (1953), in a closely-reasoned paper, considers that stutterers have a persisting infantile personality organisation that renders them vulnerable to intrapsychic anxiety. They respond to this anxiety by regression to an auto-erotic rhythmical repetition of words which is reminiscent of infantile babbling. With the further development of the syndrome, this archaic infantile erotic speech is accompanied by prolongations which can be regarded as an expression of aggression, and by glottal stops which can be regarded as a primitive reaction to anxiety. To Stein, then, this direct gratification of infantile needs by the symptom means that stuttering is not a conversion but a compulsion neurosis.

Fundamentally similar views about the dynamic origin of stuttering have been proposed by Glauber (1958) and Travis (1959). They, too, regard stuttering as an ego defence mechanism which arises in order to prevent unacceptable and anxiety-provoking instinctual impulses reaching consciousness and being actually or symbolically expressed.

Also see text pg 132 Travis (1971)

All these theories are strangely at variance with the results of the personality studies just discussed. The explanation of this may well lie in the selection of stutterers seen by psychiatrists. If an eighth to a quarter of our population have sufficient neurotic traits to constitute a definitive handicap, then it is probable that a similar proportion of stutterers will be equally neurotic. It may well be this group of stutterers that achieves referral to psychiatrists. In these people the stutter, because it varies so dramatically with anxiety, forms an acceptable excuse for obtaining treatment for their more fundamental and basically unrelated personality problems.

Barbara (1962) has written extensively about the psychopathology of stuttering. He suggests that emotionally vulnerable children may be provoked into stuttering by a variety of factors and that then, for them, simple social situations take on a new and disturbing significance. As soon as stuttering occurs the child becomes different from other children because of his speech difficulty, and there may follow a secondary elaboration of neurotic manifestations related to this speech. The syndrome then has two aspects, a primary intrapsychic neurotic conflict which renders the child vulnerable and a secondary elaboration of symptoms as the child, handicapped both by emotional difficulty and speech disorder, tries to communicate his needs and wants. As a protective compensation he clings to an idealised image of himself as not handicapped, yet he oscillates between committing himself to speech situations in which he will fail, and avoiding other more important situations in which he would probably succeed. To Barbara this is patently neurotic behaviour.

Kanner (1957) considers stuttering to be a child's reaction to emotional stress. He points out that the three- to five-year-old child is in the process of establishing good physiological control of the habits of excretion, feeding, sleeping and speaking. Anxiety at this time, whether it arises from within the child or from the child's relationship with his parents or environment, often finds expression as a disturbance in the maturation of these physiological habits. With increasing age and emotional maturity, either the problem which gives rise to the anxiety is resolved, or else the child establishes control over these functions despite the continuance of the anxiety. Thus most of these developmental disorders decline and remit with the passage of time. In some young children there is good evidence that stuttering follows this pattern. In other children however, when the other symptoms remit, stuttering tends to persist and develop further.

There is good evidence that stuttering is associated with such physiological behaviour disorders as encopresis, nightmares and feeding problems. Whether this is a function of the hostile environment in which the child develops (Moncur 1951) or is evidence of primary emotional disorder in a child (Glasner 1949) or whether this is further evidence of delayed maturation of the central nervous system in all these fields, is not certain. Most probably it is a function of all three.

The other symptoms of developmental behaviour disorders commonly remit with maturation, as indeed do many developmental stutters. The major problem then is, firstly, what is peculiar to the 1 per cent of stutterers who do not remit, and secondly, what factors or mechanisms are operative to cause the condition to continue to develop in severity despite the lack of any evidence of untoward anxiety in stutterers who have reached Phases II and III.

The problem as a whole becomes more difficult if Bloodstein's ideas about the development of stuttering and the emergence of anxiety in Phase IV are accepted. In this phase, anxiety becomes an integral part of the syndrome even though it retains its close relationship with the act of speaking. This poses the almost unanswerable question of whether this anxiety is a normal reaction to the disabling effects of a severe stutter, or whether, with the development of the syndrome, the stutterer's ego defence mechanisms become overwhelmed, and the appearance of anxiety in Phase IV is evidence of further neurotic decompensation.

3. Stuttering as a Learned Response

In the theories which regard stuttering as a learned response, the child is considered to be neurologically and psychiatrically normal, and to have learnt to stutter because of specific environmental experiences. The most impressive contribution to this idea has been the 'Evaluational Theory of Stuttering' proposed by Johnson and subsequently supported by a monumental volume of work from the University of Iowa (Johnson 1955, 1956, 1959). As a result of Johnson's interest, other workers have attempted to explain stuttering behaviour in terms of formal learning theory.

(i) Johnson's Evaluational Theory of Stuttering. This may be paraphrased in the following terms.

Non-fluencies occur in all children and initially are not significantly more common amongst the children who will stutter.

Adults differ in their standards of fluency and tolerance of mistakes. Some are concerned, being sensitive about stuttering as a family problem. Some are perfectionists generally and sensitive to non-fluent speech in particular. As a result this sensitive adult, who is usually the mother, mis-diagnoses a stutter and treats the child accordingly. This is likely to be a mis-diagnosis of normal non-fluencies, but once the children are thought to be stutterers they will be penalised for what is really normal speech.

As a result of this the children develop doubts about their ability to speak well, they hesitate, and become even less fluent. This speech in turn will be further criticised and punished. Thus by becoming aware of their speech and unsure about their ability to manage it adequately, they become stutterers. Like the centipede when told to watch how it walked, they too have difficulty once cautioned to watch how they talk.

As an extension of this hypothesis, it is assumed that the child reacts to his own non-fluencies and to the negative evaluation of his speech by developing anxiety and embarrassment about his speech, which increases and aggravates the problem. Johnson stresses throughout that this is a situation in which two people, the speaker and the listener, constantly interact in a vicious circle. The child's non-fluencies alarm the mother and the mother's concern distresses the child. Then the child in turn, being more determined not to stutter, has greater speech difficulty, putting more strain and tension into overcoming the repetitions, thus further alarming the mother.

This widely accepted theory has had immense influence upon the direction of research and therapy in stuttering. Although the theory is often criticised, the state

of knowledge about stuttering would have been immeasurably poorer but for Johnson's enthusiasm and grasp of this aspect of the problem.

In a comprehensive review of Johnson's work, Wingate (1962 a, b, c) criticises each of these propositions in turn. He states that non-fluencies in children do exist and do show considerable variation from child to child. In a few particular children there are sound and syllable repetitions which do tend to be diagnosed as stutters, but in most children word and phrase repetitions constitute the normal non-fluencies and are rarely identified as stuttering.

The second proposition is that parents do differ in their tolerance of non-fluency. Studies by Johnson (1959) and Moneur (1955) seem to suggest that within our culture parents of stutterers are more perfectionist and demanding of high standards in their children, and therefore presumably less likely to tolerate non-fluency. Cross-cultural studies which might throw considerable light on this problem are either unrewarding or methodologically unsatisfactory.

The notion that parents of stutterers are more prone to mis-diagnose stuttering has not been established. Lay people, including parents of stutterers, consistently under-diagnose tape recordings of stuttering speech. When parents of stutterers are placed in a situation where the conditions are carefully controlled they diagnose the occurrence of stuttering in other children about as frequently as do control parents.

The third proposition is that children who are penalised for normal non-fluencies are likely to develop stuttering. This is much less easy to answer. Wingate reviews some evidence that stutterers subjected to this type of penalty nevertheless recover spontaneously. Jameson (1955) felt that frequent correction of a stutter hindered improvement, but the reason for parents continuing to correct their children's speech may well be that, as these are the children with the severest stutters, the parents are merely reacting to the speech abnormality and not causing it.

(ii) *Stuttering as a learned response.* Wischner (1950, 1952) proposed an integration of some of the phenomena of stuttering using Hullian Learning Theory as a frame of reference. He took as points of departure the 'adaptation effect and the anticipation phenomenon.'

The adaptation effect refers to the reduction in the frequency of stuttering with successive readings of the same material. The curve of reduction in frequency of stuttering which is regularly obtained resembles the response decrement curve of the experimental extinction of conditioned or unconditioned responses. According to Wischner other studies have demonstrated in stuttering such learning theory analogues as spontaneous recovery, external inhibition, disinhibition and conditioned inhibition.

The anticipation phenomenon refers to the empirical finding that stutterers are able to predict accurately the words on which they will stutter before they say them. It is, of course, closely related to the consistency phenomenon. An important quality of anticipation is the unpleasant accompanying effect. This anxious expectancy of stuttering is described subjectively as building up to a crescendo as the feared word is said and declining rapidly thereafter (Wischner 1950). Subjective reports of this anxious expectancy are supported by physiological evidence of changes in

anxiety levels. There is a concurrent alteration in the galvanic skin response, alteration in the pulse rate and alteration in the E.E.G. alpha index. It is also interesting that the conditioning of other anxiety-motivated responses is facilitated during the brief period that this specific expectancy anxiety is present. Wischner named this phenomenon 'specific word-anxiety'.

There is a considerable body of evidence that a 'general situation anxiety' exists which also affects the frequency of stuttering. This general situation anxiety is related to the situations in which a person must talk, to the size and importance of the audience, to the importance of the conversation, and to the physical characteristics of the situation such as the presence of a telephone or microphone.

The adaptation phenomenon is a convenient way of studying the inter-relationships of these two types of anxiety. With an alteration in the general situation anxiety by the introduction of additional members of an audience, the rate of adaptation will be slowed or halted. If a large audience be present from the beginning there will be an alteration in the initial severity of stuttering and thus in the height of the adaptation curve although the actual shape of the curve will resemble the normal low anxiety adaptation curve. When the specific word-anxiety is maintained or increased by frequent changes of the reading material, adaptation is slow or fails to occur. When both the specific word-anxiety and the general situation-anxiety are simultaneously increased the adaptation rate is completely halted or reversed. This is shown in Fig. 2.

The severity of stuttering at any moment, therefore, seems to be a function of the anxiety related to particular words, and the anxiety related to the speech situation in which the subject finds himself. On the basis of these experimental observations Wischner, in his theoretical analysis, suggested that there was evidence that stuttering behaviour was learnt, and that anxiety is a secondary motivational component. He likened the phenomenon to instrumental avoidance learning, for the stutterer can be compared to a rat in a cage which runs away at the sound of a buzzer, because this is followed by an electric shock and has become a cue which arouses anxiety. For stutterers the cues for anxiety are speech situations in general and certain words in particular. Wischner suggests that they have acquired this capacity through specific learning situations and subsequent stimulus generalisation. Thus the presence of the significant word gives rise to anxiety and this motivates the avoidance activity.

To Johnson, the noxious stimulus or shock that stutterers wished to avoid in the original specific learning situation was the parental disapproval of childhood non-fluencies. Wischner remarks that while this may be true for some, learning situations are peculiar and particular to each person and many other conditions may be implicated.

That certain words and situations may become conditioned stimuli that arouse anxiety specifically related to speech is granted, but why this should result in stuttering is less clear. Wischner proposed two hypotheses:

Firstly, that while the anxiety is a learned response, the stutter represents a disintegration of organised speech behaviour consequent on the stress of the anxiety which is specific to the speech act.

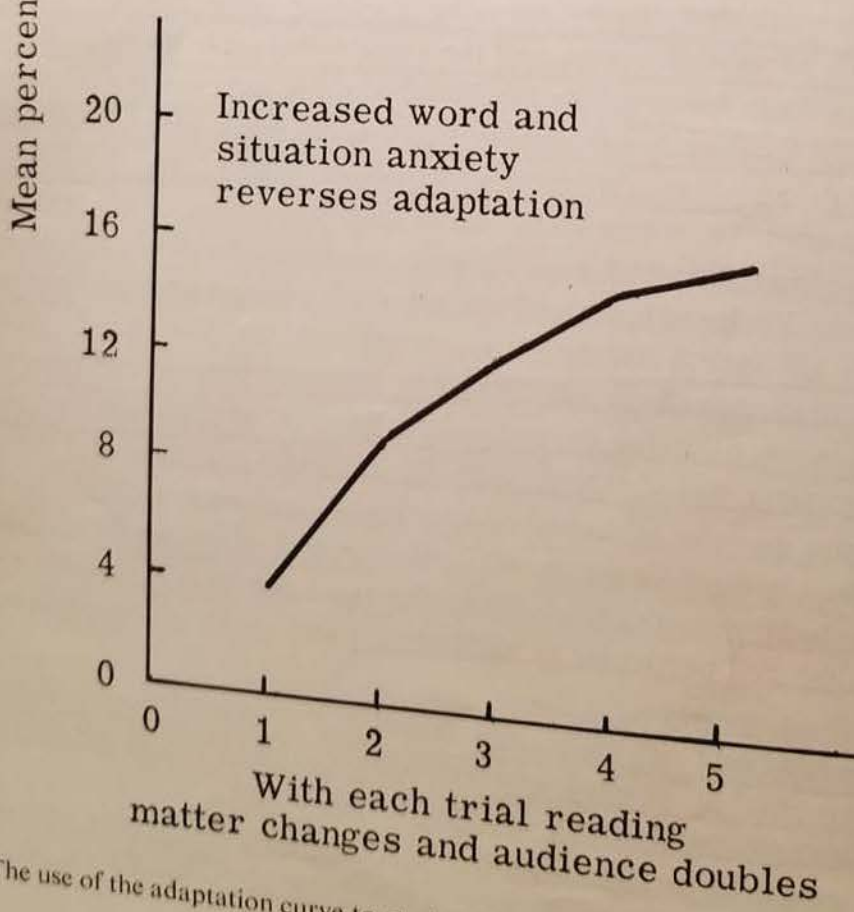
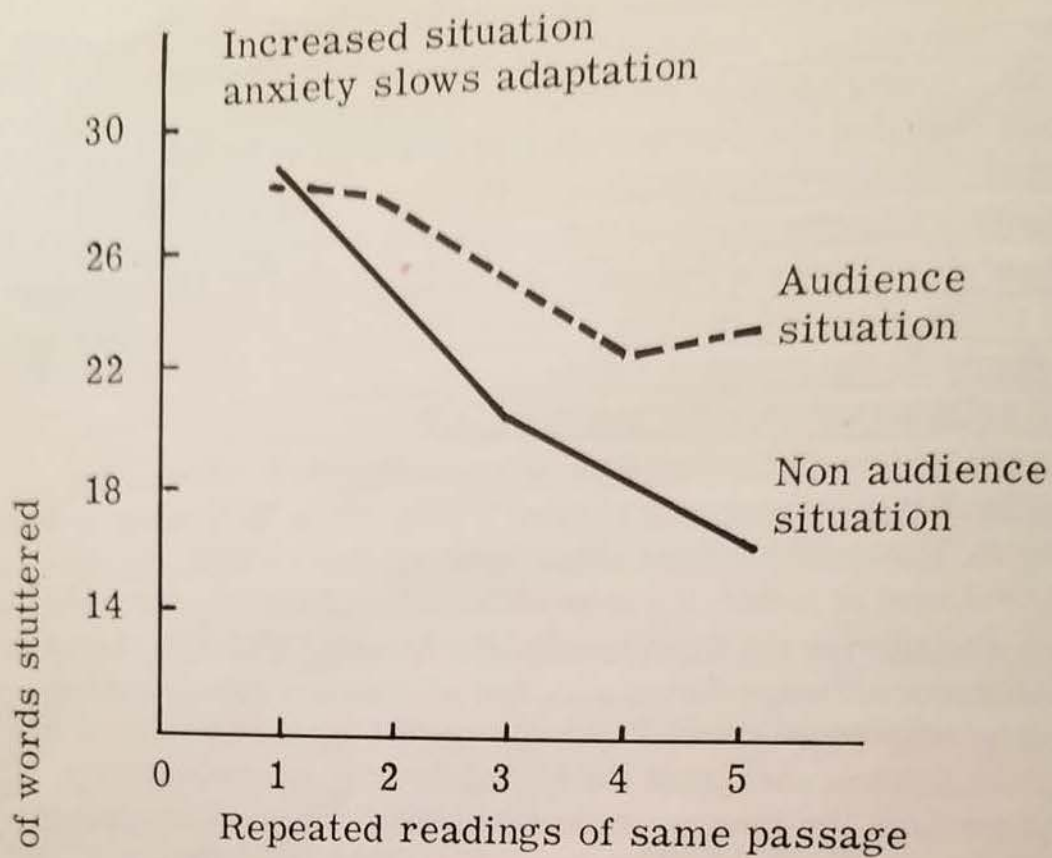


Fig. 2. The use of the adaptation curve to study specific word-anxiety and general situation-anxiety.
(After Wischner 1952)

Secondly, that both the anxiety and the stutter are learned. The speech behaviour is the result of an approach-avoidance conflict in which the stutterer wants to speak, but fears to in case of further disapproval, and thus a pattern of speech which delays the saying of words is reinforced as adaptive behaviour.

Wischner is on more solid ground when he discusses the manner in which stuttering behaviour is perpetuated. He considers that it is reinforced:—

1. because of its close temporal association with the anxiety-reduction consequent on saying the feared word,
2. because the stuttering response results in a delaying of having to say the feared word,
3. because stuttering confirms the expectancy of stuttering,
4. because the situation and word-avoidance symptoms which become such a prominent part of stuttering are very effective in avoiding the instigation of anxiety altogether,
5. because of secondary gain, for stutterers may learn to use their symptom to obtain consideration from listeners or to control a speech situation so that others must wait and listen.

The particular and diverse symptoms occur because the stutterer, anticipating difficulty, uses the various associated techniques with voice or body to help him to say the difficult word. Because of the close proximity of these acts to the anxiety-reduction which is reinforcing, these acts too become learnt as an integral part of the total stutter pattern and thus the syndrome develops through the phases described earlier. This of course is an immensely important contribution of learning theory to the understanding of the development of the complex syndrome.

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A further system which considers stuttering in terms of learning theory is that of Sheehan (1953). He considers stutterers to be typically 'speech doubters' who are caught in a conflict between wanting and fearing to speak. The conflict is thus an approach-avoidance conflict, and, in order to account for both the momentary block in speech and the subsequent release from the block, he establishes two propositions:

The Conflict Hypothesis. The stutter stops whenever conflicting approach and avoidance tendencies reach an equilibrium.

The Fear-Reduction Hypothesis. The occurrence of stuttering reduces the fear which elicited it, so that during the block there is sufficient reduction in fear-motivated avoidance to resolve the conflict, so permitting release of the blocked word.

The two conflicting alternatives are firstly, to speak, which although it achieves communication also brings shame and guilt because of the stutter, and secondly, to remain silent, but here although there is no stuttering the avoidance of communication itself is also followed by frustration and guilt. This conflict between two alternatives when each alternative has positive and negative features means that the situation is best viewed as a double approach-avoidance conflict. When these conflicting approach and avoidance drives reach an equilibrium there will tend to be an oscillation about this point as first one and then the other becomes predominant. It is this oscillation that produces the principal stutter symptoms of repetition and prolongation. The secondary symptoms are considered as either compensatory

effects to overcome the blocking, or behaviour expressive of the stutterer's unconscious attitude to the listener.

He suggests that it is profitable to consider this approach-avoidance conflict at five distinct levels.

1. At the word level, through past conditioning on that particular word. This is directly comparable to Wischner's specific word-anxiety.
2. On the situation level, when learning in previous speech situations results in an unwillingness to enter them again. This is comparable to general situation anxiety.
3. When there is conflict due to the emotional content of speech. He cites as evidence the increase in stuttering when personally derogatory material is read.
4. When there is conflict on an inter-personal relationship level; for instance the common increase in stuttering when speaking to authority figures.
5. On an ego-protective level. Stuttering then serves unconsciously as a means of keeping the individual out of competitive endeavours which would pose a threat of failure or a threat of success.

It is rather difficult to demonstrate that there is a sufficient reduction in 'fear-motivated avoidance' during the block to permit the release of the blocked word, for such evidence as there is would suggest that the tension increases until the block is finished and the word is said. Conceding this, Sheehan suggests that although there is a reduction in fear which determines the release from the block, this may be obscured by a simultaneous increase in avoidance drive as the stutterer at last comes to the point of saying the word.

A full statement of his theoretical position and its implications for therapy may be found in a review by Sheehan (1953) in which he 'seeks to integrate advances in speech pathology, psychopathology, and learning theory into a systematic theory of stuttering'.

Sheehan's use of the Dollard and Miller formulation to unite theoretically psychoanalytic and learning-theory approaches to stuttering is a major recent contribution to thought on the subject. The manner in which it has influenced treatment will be discussed in Chapter 8.

Discussion

Research in the behavioural sciences appears to proceed in a series of steps. The first and most important stage is the work of sensitive, perceptive and gifted clinicians who observe, remember and compare the clinical material with which they deal. From their clinical knowledge they develop tentative hypotheses concerning their material.

The next step is to examine all the available clinical material, and if the hypothesis still appears worthy of consideration, then the results should be published. It does not detract from the validity of their results if these are confined to the one specially selected group, for the value of their contribution lies in the detailed observation of a limited number of cases; cases which should be reported simply and accurately and enriched by valuable clinical judgments as to the possible meaning of the findings.

Then should come a formal attempt to validate these hypotheses. This research is frequently detached from the clinical setting, and here representative population samples, carefully matched control groups, rigid control of methodology and evaluation by complex statistical techniques are essential.

By such a process clinical hypotheses are not only validated but also placed in perspective within the body of knowledge about a condition. This alternation of hypothesis formulation and testing should constantly recur, for by such means is knowledge advanced. The final step of isolating, defining and testing an aetiological agent, although relatively common in surgical pathology, remains extremely difficult and to date almost unattainable in the behavioural sciences.

The literature on stuttering is rich in reports of clinical material from gifted and perceptive authors. From the review of some of the literature just presented it will be realised that population studies of good methodology, which form the second stage of the process, are not nearly as frequent as could be desired.

This monograph is in part a contribution to this stage; Chapters 3-6 'The Natural History of Stuttering' and 'The Survey of Stuttering in School Children' are conceived within this framework. In Chapter 7—'The Genetics of Stuttering'—Dr. Kay uses survey and other material to discuss this aspect of stuttering.

The Natural History of Stuttering

The Speech Development of 1,000 Children

From 1946 until 1962, the University of Durham and the Health Services of the city of Newcastle upon Tyne combined forces in an investigation of the diseases and disorders of the developing child. This investigation took the form of a family survey and included all children born within the city limits during May and June 1947. The original number of children was 1,142, but through deaths and removals the number slowly declined until, at 15 years of age, only 750 children remained within the survey. The work of the survey has been reported by Spence *et al.* (1954), Morley (1957) and Miller *et al.* (1960).

As well as investigating the diseases of childhood and the conditions under which children were raised, these workers paid considerable attention to the development of speech. All the families were seen regularly by health visitors, who reported on the child's acquisition of speech and its progress towards intelligibility, and on the presence of any defects or abnormalities. At regular intervals, speech therapists saw all children in whom defective speech development or stuttering had been reported, as well as seeing a 1 in 10 sample of the total group. Thirty-seven of the 944 children included in the survey were reported as having, between the ages of 2 and 7 years, some form of interference in their fluency 'usually described as stammering or hesitating'. In 16 of these children the episode was mild and transient, but in the remaining 21 children the difficulty was more persistent, lasting for six months or more.

Compared with the rest of the children in the survey these 37 were late in acquiring words, phrases and intelligible speech. There was also a significant trend for these children to come from social classes IV and V and to come from families in which there was a degree of undesirable social pathology (Morley 1957, Miller 1960).

In 1963, when the children reached the age of 16 and their participation in the survey ceased, records were again searched for all those children who had been observed by teacher, health visitor or speech therapist to have had a period of frank stuttering that lasted for more than six months. The 16 children who had been reported as having transient periods of hesitation during their development of speech were excluded. Twenty-seven of the 847 children remaining in the study at its conclusion were noted to have had a period of stuttering which lasted six months or more; thus the 21 children who had been noted to have an episode of stuttering before the age of 7 were later joined by a further 6 children to give this total of 27. In this longitudinal study of a population sample of 1,000 children to the age of 16, 3 per cent either were stutterers or had stuttered for a period of six months or longer. If the 16 children who had transient periods of hesitation during the development of speech are included, the incidence of the disorder rises to 4.5 per cent.

Results of cross-sectional studies were given earlier. They have regularly returned a figure in the region of 1 per cent. This is, of course, the prevalence figure, the

number actually stuttering at any one time, and does not allow for those who have already remitted, or those who have not yet begun to stutter. In the 1,000-Family material, if the 27 children are further analysed as to how many were stuttering each year, then the prevalence of stuttering is seen to be 0.5 per cent at the age of 3, climbing to a maximum of about 1.6 per cent at the age of 8, and appearing to become steady at about 1.1 per cent at the age of 12. The mean prevalence for the years 3-15 is 1.2 per cent. These prevalence figures resemble those obtained by other workers with cross-sectional studies and are consistent with the results of the 10-year-old cross-sectional survey to be reported. This concordance of the prevalence figures suggests that the estimate of an incidence during childhood and adolescence of 3 per cent definitive stuttering within the population might well be generally valid.

Sixteen children had a transient episode of hesitation between the ages of 2 and 4. These children do not concern us here. The 27 children who had an episode of stuttering of six months or longer began to stutter somewhere between the ages of 3 and 11, the maximum frequency of onset being in the pre-school years. The occurrence of new cases becomes progressively less common from then on. This may be seen from the accompanying table.

TABLE 2. Age of Onset

Age in Years	...	3	4	5	6	7	8	9	10	11	12	13	14	15
Onset by year	...	5	4	5	3	3	2	0	4	1	0	0	0	0
Cumulative total	...	5	9	14	17	20	22	22	26	27	27	27	27	27
Cumulative per cent		18	33	52	63	74	82	82	96	100	100	100	100	100

This distribution of age of onset is consistent with that reported in the literature and is remarkably similar to that found in the Newcastle survey on 10-year-old children (cf. Chapter 6). In both surveys, half had begun to stutter by the age of 5 and all had begun by the age of 11.

These 27 children consisted of 8 girls and 19 boys, a sex ratio of 2.4 boys to 1 girl. In prevalence figures year by year, the sex ratio is always higher than this. During the first 5 years it averaged 2.6 to 1 and during the last 5 years covered by the survey the ratio had risen to 3.6 boys to 1 girl. As the mean age of onset of stutter was the same for both sexes, this suggests that the girls begin to stutter as early as the boys but continue to do so for a much shorter time.

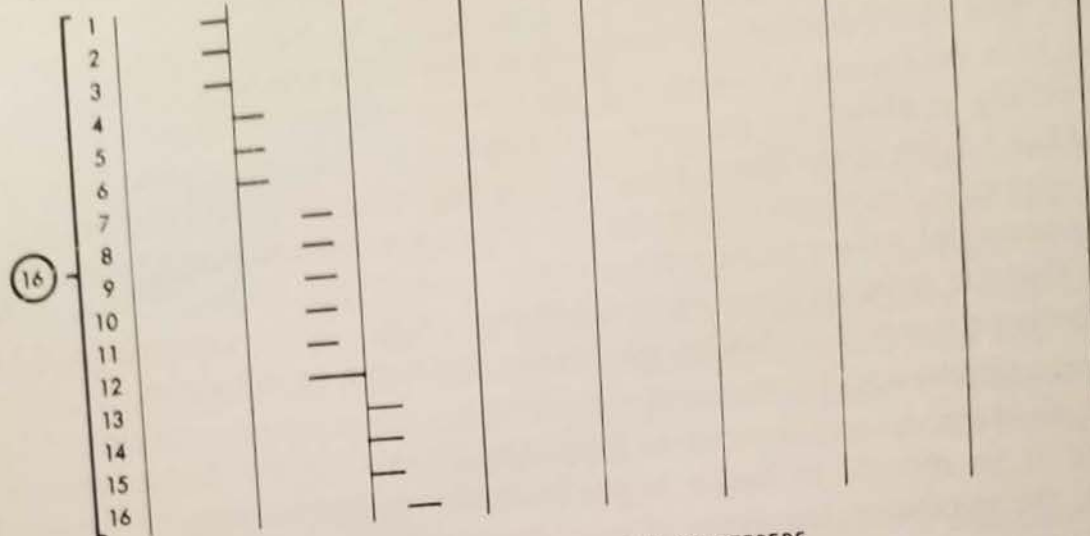
This detailed material on 1,000 children gives some idea of the natural history of stuttering. In the total of 43 children who stuttered at any time it is possible to make the following groupings.

1. *Transient Developmental Stuttering.*

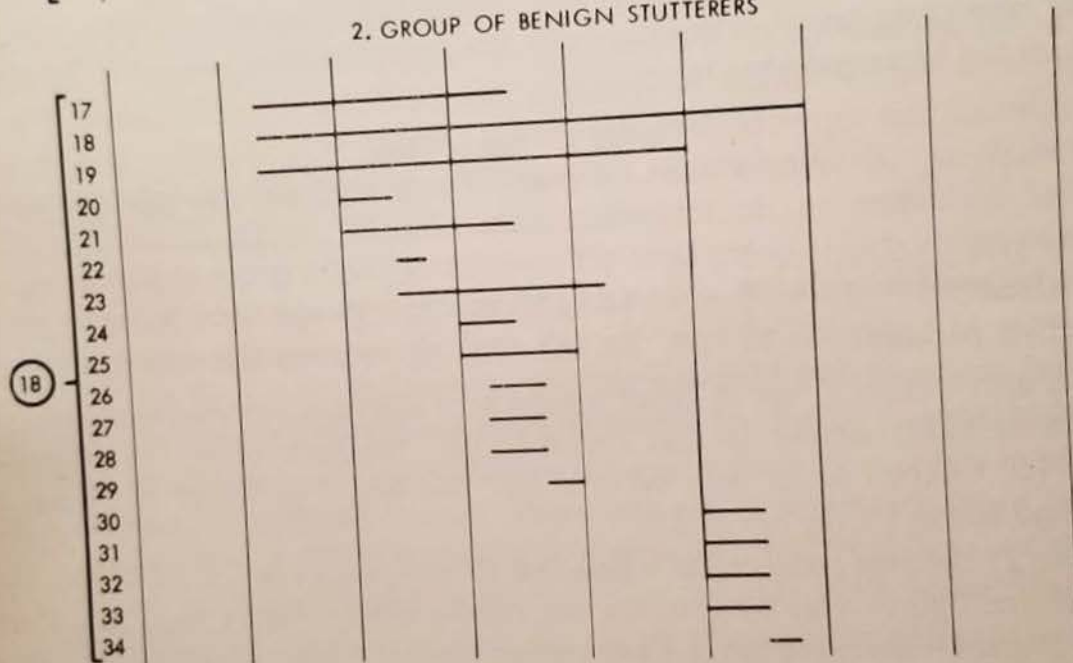
Sixteen of the 43 children had a transient period of difficulty in the smooth articulation of speech between the ages of 2 and 4, at the time when they were developing language. They appear to be essentially similar to Métraux's developmental stutterers and have been so labelled. The intellectual deficit and social pathology which was common in the children who stuttered for longer periods is also evident in this small group. Thus the difference between this group and the others would appear to be quantitative and not qualitative (Fig. 3).

1. GROUP OF DEVELOPMENTAL STUTTERERS

Case No.



2. GROUP OF BENIGN STUTTERERS



3. GROUP OF PERSISTENT STUTTERERS

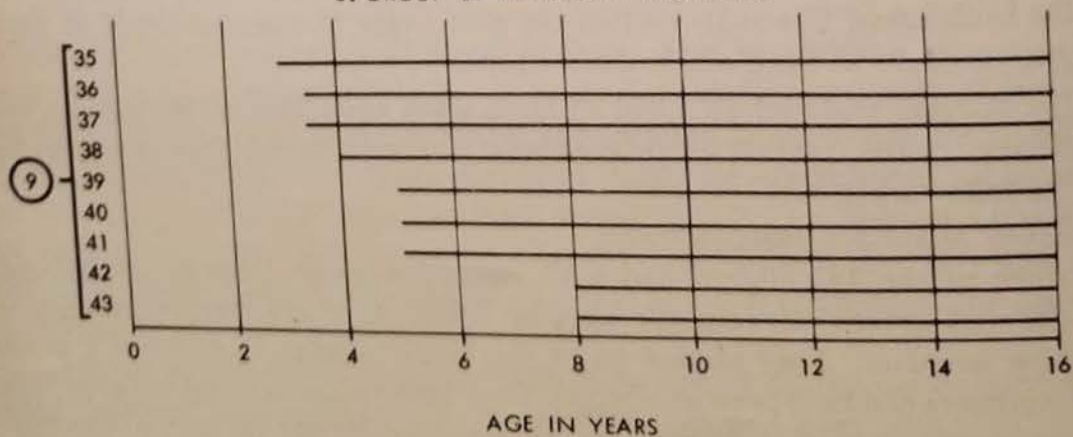


Fig. 3. The onset and duration of stutter experienced by the 43 children.

2. *Benign Stuttering.*

Eighteen of the 43 children remitted after an average of only 2.1 years of stuttering (range 6 months to 6 years). These children had a surprisingly late mean onset of their stutter, the mean being $7\frac{1}{2}$ years with a range of 3-11 years. In none of these children could it be claimed that the remission was induced by treatment.

3. *Persistent Stuttering.*

Nine of the 43 children were still stuttering at the age of 15 years. Most had begun to stutter as toddlers and all but one before the age of 6. The mean age of onset was 4 years and so most had continued to stutter for 10 years.

From this material it seems that there may be three relatively distinct groups of stutterers. Firstly, a developmental group which comprises 2 per cent of the population and two-fifths of the total stutterers. They stutter for only a month or two during the acquisition of language. Next, a benign group of stutterers who begin at any time between 3 and 11 years and only stutter for a year or two before spontaneously remitting. This group also comprises 2 per cent of the population or two-fifths of all stutterers. Lastly, there is a persistent group comprising 1 per cent of the population, or one-fifth of the total stutterers. They begin as early as the developmental group but continue for at least 10 years. It is not known whether spontaneous remission will occur in this group at a later date.

It was possible to analyse the other characteristics of the 27 benign and persistent stutterers. In 7 of these children there was a history of late onset of speech, and in 9 a history of the presence of articulatory difficulty. This confirms the findings of Morley (1957) that late and poor talking are associated with the development of stuttering.

During the course of the survey, the intelligence of these children was assessed on three occasions. Eighteen of the 27 children returned scores which were consistent with an I.Q. below 90, 7 returned scores within the average range, and only 2 had an I.Q. of over 110. This scatter of results is significantly different from that obtained from the remainder of the 1,000 children in the survey, and suggests that stuttering is more common amongst children with an intellectual deficit.

Stuttering also appeared to be more frequent amongst children when there was social pathology in the home environment. In 6 of these 27 there had been loss of one parent, and in a further 6 there was evidence of abnormal dependence upon social agencies by the family, or signs that the children had been deprived of parental care. Thus, in many of these 27 children, quite striking adverse social factors were operative.

The Incidence in the Community

To explore the possibility that the true incidence (not the prevalence) of stuttering is in the region of 3-5 per cent, a small population survey of 821 persons was conducted. A consecutive series of adults, attending a General Practitioner for independent medical reasons, were questioned about the occurrence of stuttering in themselves and in their families within the practice. Two hundred and six adults were seen and 10 of these gave a history of being or having been stutterers, four of them being actually heard to stutter at the time. Information was gathered about the 615

members of their families who lived in the practice and, of these, 22 were said to be, or to have been, stutterers.

These subjects lived in a large new housing estate on the edge of the city, tended to come from social classes III, IV and V, and had an unusual age distribution in that they consisted of adults between the ages of 25 and 55 and a similar sized group of children between the ages of 0-20. There was thus a singular lack of people in their early twenties and people over the age of 50. The high incidence of stuttering reported was probably related to the social class distribution, but the age distribution should not have affected the figure too greatly.

In this limited material, 4.8 per cent of people interviewed reported themselves as having been or being stutterers. 3.6 per cent of their relatives were said to have been affected at some time. Of the total material, 3.9 per cent were reputed to be, or to have been, stutterers. Analysis of this material in specific age groups showed a remarkably constant incidence figure. Naturally, there was a higher prevalence of actual stutterers amongst the children. The ratio of males to females among the stutterers was 2.5 to 1.

This limited survey of the incidence of stuttering in a population gives results that are surprisingly consistent, considering the small numbers involved, with that obtained from the 1,000-Family study.

It would seem likely, then, that some 3-4 per cent of the population may experience an episode of stuttering in childhood, but in only 1 per cent will the stuttering persist for 5 years or longer.

Survey of Stuttering in Schoolchildren

Methods

Introduction

A study of the literature of investigations into stuttering reveals that much of the work has been done with selected samples. A frequent source of subjects has been the University clinics. Controls, if indeed they have been used, have often been selected from students at the associated University. This method of selection is not particularly satisfactory, for it is unlikely that the stutterers seen in the clinics represent a cross-section of stutterers in the community. As Ingram (1963) has pointed out, many other factors besides the severity of the overt symptom motivate people to seek treatment.

There have been a few surveys in which an attempt was made to look in a broad fashion at a true sample of the population. Moncur (1951, 1955) saw 48 stutterers from the Californian school system and matched them with non-stuttering children. The 48 stutterers did not represent the total stuttering population, for he discarded the mild cases and it is not clear what percentage of the total sample he finally interviewed.

McDowell (1928) surveyed 7,000 school children and found just under 1 per cent to be stutterers. Matching them with non-stuttering children, she carried out a programme of testing designed to evaluate differences in personality, health, educational achievement and language ability. In Scotland, Morgenstern (1953) saw by proxy 30,000 schoolchildren and ascertained, from those who stuttered, facts about family and social status.

The most complete survey is that of Johnson (1959) who collected data on 250 young stuttering children and 250 non-stuttering children. In each case the mother and father of each child were interviewed separately as soon as possible after the onset of stuttering. He used a complicated questionnaire in which interlocking series of questions to each parent were designed to increase reliability. The limitation of this very thorough work is that the cases were not a population sample, but were obtained from the neighbouring University clinics and thus were of upper socio-economic status. The value of the study was further decreased when it was decided to exclude children with evidence of other handicaps, and those from broken or unstable homes. The results of these four studies were presented in Chapter 2.

In 1962, under the auspices of the Metcalfe Bequest in the University of Durham, an epidemiological survey of stuttering in schoolchildren was initiated. Its aims were to examine a representative sample of stutterers and their mothers and match them with non-stuttering children and their mothers. The design aimed at ascertaining the factors other than stuttering which differentiated the subjects from the control group. An attempt was made to cover the following areas:

1. The symptomatology of the stutter and the history of the child's speech development.
2. The child's current emotional adjustment.
3. The child's intelligence and performance on a number of special ability sub-tests.
4. The physical and emotional aspects of the child's home environment.
5. The mother's personal history, emotional maturity and techniques of family management.

The Subjects

It was decided to survey all the children in the last two years of their primary schooling (age range 9-11 years) in the city of Newcastle upon Tyne.

Newcastle has been a centre of population throughout recorded history. Its geographical situation and military and economic importance has meant that it has in turn been a Celtic settlement, a Roman encampment, a Norman fortress, and a medieval town.

Since the Middle Ages, Newcastle has been an important port, situated in the midst of coal fields. It developed rapidly during the industrial revolution, but, unfortunately, amenities for the population did not progress as rapidly as those for industry. Only in recent years has substantial progress been made towards adequate slum clearance and the provision of proper low cost housing (Figs. 4a, b and 5a, b). In the 1930's the economic recession severely affected the heavy industrial complex which is the heart of Newcastle, unemployment became widespread and poverty rife. In the 60's a milder economic recession occurred, and for the few months at the start of the survey 6 per cent of the work force were registered as unemployed.

The circumstances of geographical isolation and the harsh realities of the environment have created a proud, insular and industrious people with their own particular dialect and culture. The nature of this community means that, even though the survey population is representative, the results obtained may not easily be compared with those from other communities, unless the variables in question are unaffected by these particular cultural factors.

The children of Newcastle begin school at the age of 5, and almost all of them go to the State-maintained schools. At the time of the survey the children selected were in their fifth and sixth years of schooling, being between 9 years 2 months and 11 years 8 months. By this age a significant minority were already attending the independent schools in the city.

This 10+ and 11+ age group of children was chosen because it fulfilled the requirements of the survey in many ways. By the age of 10 almost all who are going to stutter have begun to do so, and the prevalence of stuttering in the community is near its maximum. At the end of the child's primary schooling he is particularly well known to his class teacher, a fact that is important in the initial ascertainment of the stutter.

10 and 11 years of age appear to be times of relative emotional calm in the development of many children (Gesell and Ilg 1946). It was thus thought that emotional



Fig. 4a. Newcastle children playing outside their old homes, now condemned.



Fig. 4b. Taken facing the other way, this photograph shows the new homes into which the children are moving.

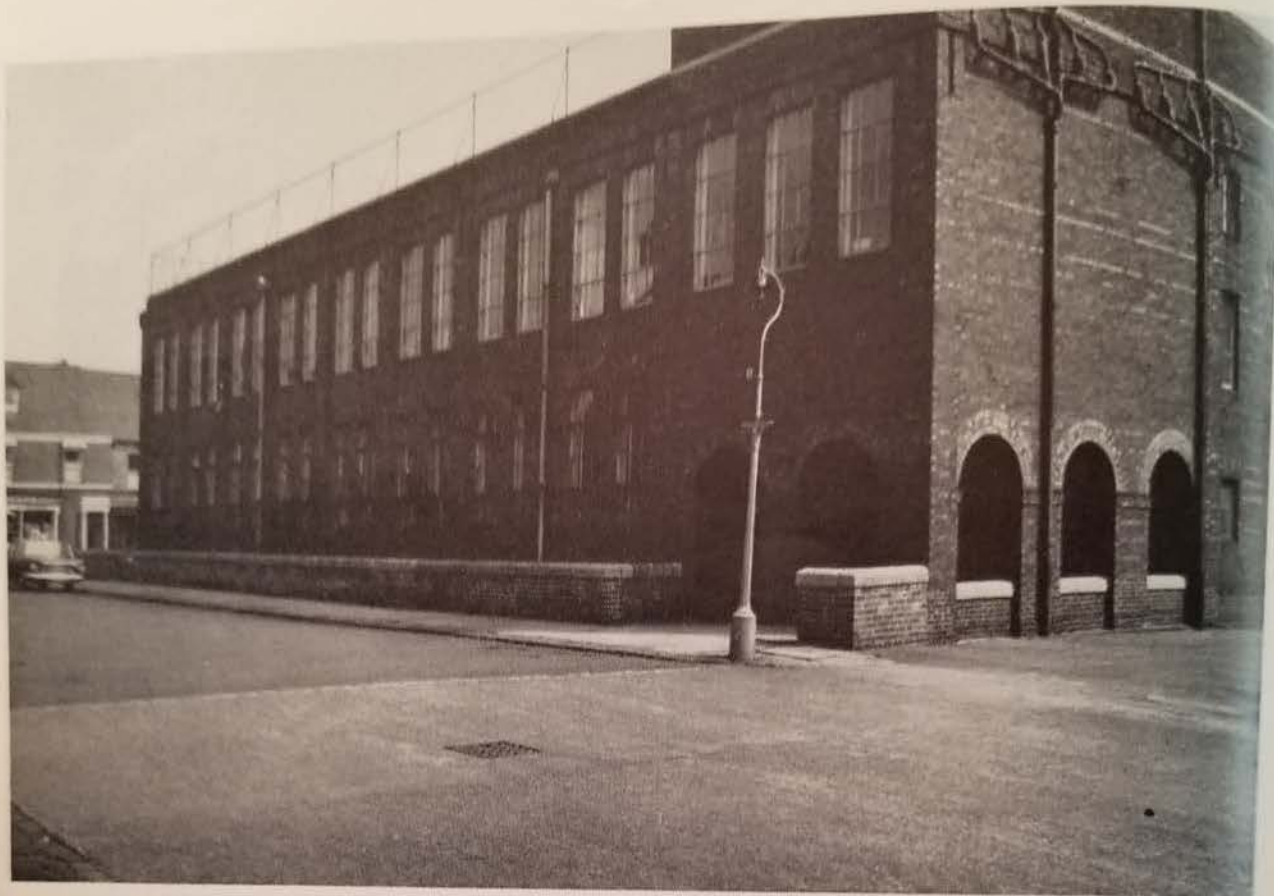


Fig. 5a. One of the old schools in Newcastle.

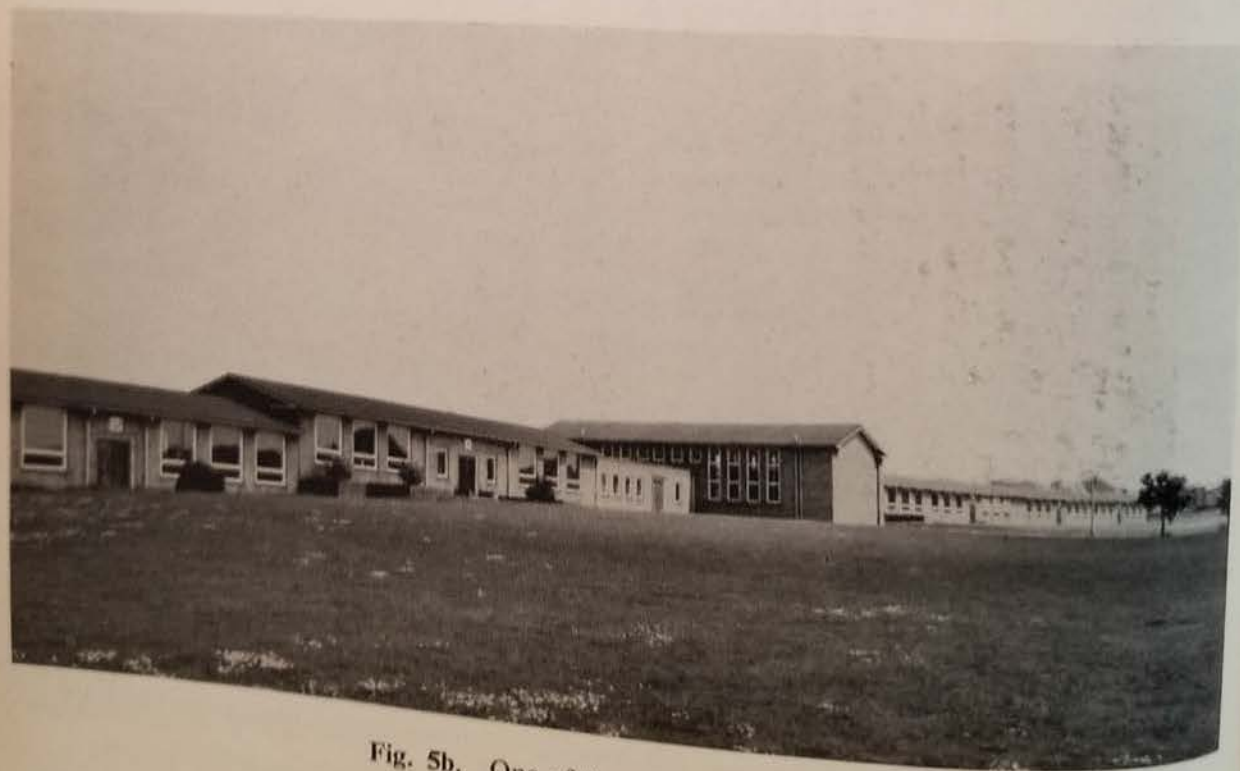


Fig. 5b. One of the newer schools.

disturbance related to stuttering would be more obvious if uncontaminated by other concurrent developmental problems.

The age of 9 to 10 years is probably the first at which a child can enter an adult interview situation and talk about matters that are important to him. One of the recurring problems in studies of child development is that the mother is the usual informant. It has been shown (Sarason *et al.* 1960) that not only are mothers more defensive and less reliable as informants than fathers, but that, the more disturbed the child, the more defensive and unreliable is the mother's evidence. By taking time to see the child personally we felt we might partially circumvent this difficulty.

It was impossible to interview the fathers because, in this community, not only are children thought to be the concern of mothers alone, but the prevailing unemployment meant that few fathers were prepared to risk their jobs by taking time off to attend hospital.

The ascertainment of the stuttering child was conducted with care according to the following scheme. An approach was made to all schools situated within the boundaries of the City of Newcastle. The Head Teachers of the State-maintained junior schools were approached through the local School Medical Service and the Education Committee. The Head Teachers of the independent schools were approached individually by letter from the Professor of Child Health. All schools approached agreed to co-operate and participate in the survey. The letter to the Head Teachers gave a brief description of the purpose of the survey, and asked for their assistance in the selection of the stutterers and control children and for permission for the team to visit the school.

We suggested that the relevant class teachers completed a list of all the children who stuttered. A simple, descriptive definition was offered as a guide.

'Stuttering is an interruption in the normal rhythm of speech, noticeable to listener and speaker; it is characterised by either the repetition of initial sounds or words, or lengthening of a sound within a word, or involuntary cessation of speech. We are interested in all degrees of severity of this condition, even in those children who have mild and fleeting symptoms.'

In the letter, considerable emphasis was placed upon the necessity of ascertaining all the stutterers in the sample school population to make this a worthwhile study.

This method functioned very well. The teachers certainly overlooked no stutterers, and, indeed, put forward a number of other varieties of speech disorder in their zeal to ensure a full coverage. A child was included in the survey as a stutterer only if he was actually heard to stutter when interviewed at school. At the time of the school visit the concept of stuttering was discussed with the teachers, and any additional children whom they thought might fit the description were interviewed. The children, too, were asked whether they knew of other stutterers in their class. The clinic records were searched for known stutterers of this particular age group, but did not reveal any subjects who were unknown to the school authorities.

Each Head Teacher's assistance was then sought in the selection of non-stuttering children to act as controls. These children were of the same sex as the

stutterer and adjacent to him in age on the class roll, thus matching for age and sex was to be exact. Two names were taken, the child immediately older and the child immediately younger than the stutterer, because it was anticipated that co-operation from control parents might be less than perfect and thus a spare control might well be needed. This second, alternative control child was required in only 10 cases.

Coming from the same class at school, the children were already partially matched for social class, for they tended to come from similar residential areas. In many schools, streaming according to intellectual ability had begun in preparation for the forthcoming grading examination at 11 years, so that the stutterer and his classmate control tended to be partially matched for intellectual ability. Differences between stutterer and control groups in social class and intelligence would thus tend to be minimised.

The total school population surveyed was 7,358. Eighty-six of these children were identified as stutterers and all were approached and invited to participate in the survey. Eighty of these did so and six did not. The reasons for the omission of these six children were as follows:

Number 81—the child was in an orphanage, and, although both parents were alive, permission could not be obtained.

Number 82 was said not to be a stutterer by her parents, but her elder brother who later attended for treatment for his stutter confirmed our diagnosis.

Number 83—the mother could never be contacted; whenever we called she was out; she made no reply to our letters.

Number 84—the mother was too ill to co-operate, and the father was too busy attending to the needs of his large family to be able to afford time to attend the clinic.

Number 85 emigrated to Australia in the months between ascertainment and the clinic interview.

Number 86—the parents of this child refused to participate in the survey.

The mother could not be interviewed in three cases. In the first case she had deserted the family, and in the other two cases, the mother was suffering from a chronic psychiatric illness and was unable to attend. In one of the control cases it was impossible to interview the mother because she was in hospital with a chronic physical illness. In these four cases the father brought the child to the clinic and acted as informant.

The fundamental question in a survey of this nature is whether or not the experimental and control groups are basically similar, so that the differences revealed can be related to stuttering. The only further difference in the composition of these two groups is that whereas only 6 of the stutterers approached failed to participate, 10 of the original controls refused co-operation. It seems that this small difference in refusal rate could have had little effect upon the results obtained.

It was felt that the survey was greatly strengthened because it drew its pairs of children from similar school and residential environments, and that this far outweighed the disadvantage of partial matching for intelligence and social class.

Technique of Investigation

1. *Assessment of the Child's Speech*

The speech therapist visited the schools by appointment to see the children nominated by the teachers as stutterers.

The children were interviewed individually, asked to read a standard passage and to answer standard questions about their stutter, and were encouraged to talk freely on any subject interesting to them. The child's speech while reading, answering questions and talking freely, was evaluated, and gradings allotted on the three point scale (see p. 4). The particular form of the stutter was recorded in detail. A description of the child and his ideas about stuttering were recorded and relevant comments from the school added. The speech therapist saw the child again on the day of the clinic visit, and where necessary made tape recordings of the child's speech or expanded the earlier speech examination in other ways.

The parents of each child were approached with a letter which described the purposes of the survey and invited their co-operation. It included a clinic appointment for the mother and child. Where this did not prove convenient another was sent; if this was also inconvenient, a personal visit was made to the home to discuss the matter, but this was necessary in only a few of the cases.

All the children included in the survey and their parents were seen at the clinic. On the day of the appointment the speech therapist called for the mother and child at their home and drove them to the clinic. The primary reason for so doing was to show our appreciation of their co-operation, but there were a surprising number of other indirect benefits that accrued from this gesture. The child again saw the speech therapist and felt reassured about coming to the hospital clinic. More important, the speech therapist was again able to listen to the child's speech, as the mother, child and therapist drove across the city to the clinic. On the journey the mother usually enquired about the purposes of the survey, and minor anxieties and misconceptions were dealt with in a friendly and informal manner. We attribute the very low percentage of refusals to participate to this offer of transportation. Certainly all cases arrived on time, and if they were indisposed and unable to attend that day the clinic team was informed promptly.

2. *The Direct Psychiatric Interview with the Child*

The interview comprised the following items:

- (i) *The General Anxiety Scale for Children*. The G.A.S.C. (Sarason 1960), which had been standardised upon London schoolchildren, required two very minor modifications in the phrasing of the questions to be suitable for Newcastle. The related Test Anxiety Scale was found to be unsuitable for use with stutterers, for during a pilot study it was discovered that they supposed the questions to refer to situations requiring verbal answers. The G.A.S.C. did not suffer from this disadvantage.

After a prepared introduction to the interview and to this test in particular, a copy of it was placed before the child and the items were read aloud by the interviewer. No assistance with the items was offered, except for ensuring that the children understood the mechanics of marking the answers. The G.A.S.C. was selected to be the first item in the interview because by its structured form it tended to resemble

normal school work and yet by the content of the questions it set the tone of what was to follow. As no verbal responses were required it was felt to be a reassuring introduction to the interview for the stutterers. When personality questionnaires follow similar items, there is often a distortion of the result, but by placing it first this positional effect was eliminated.

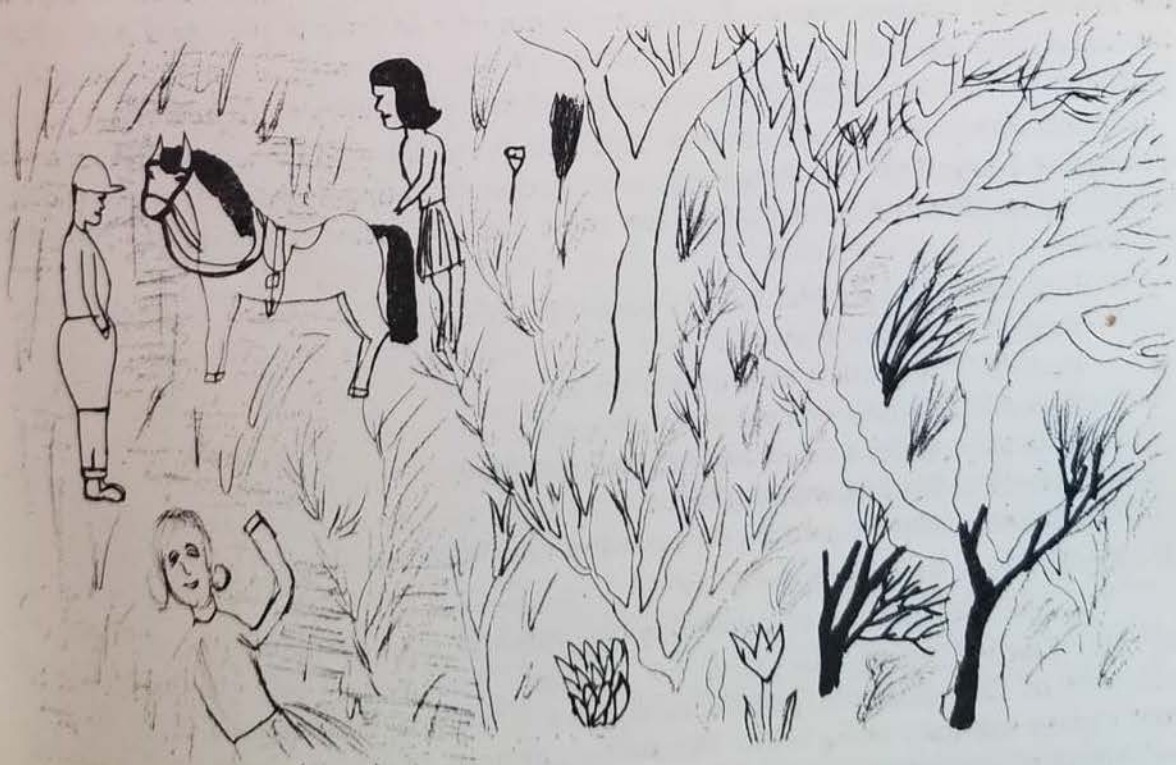
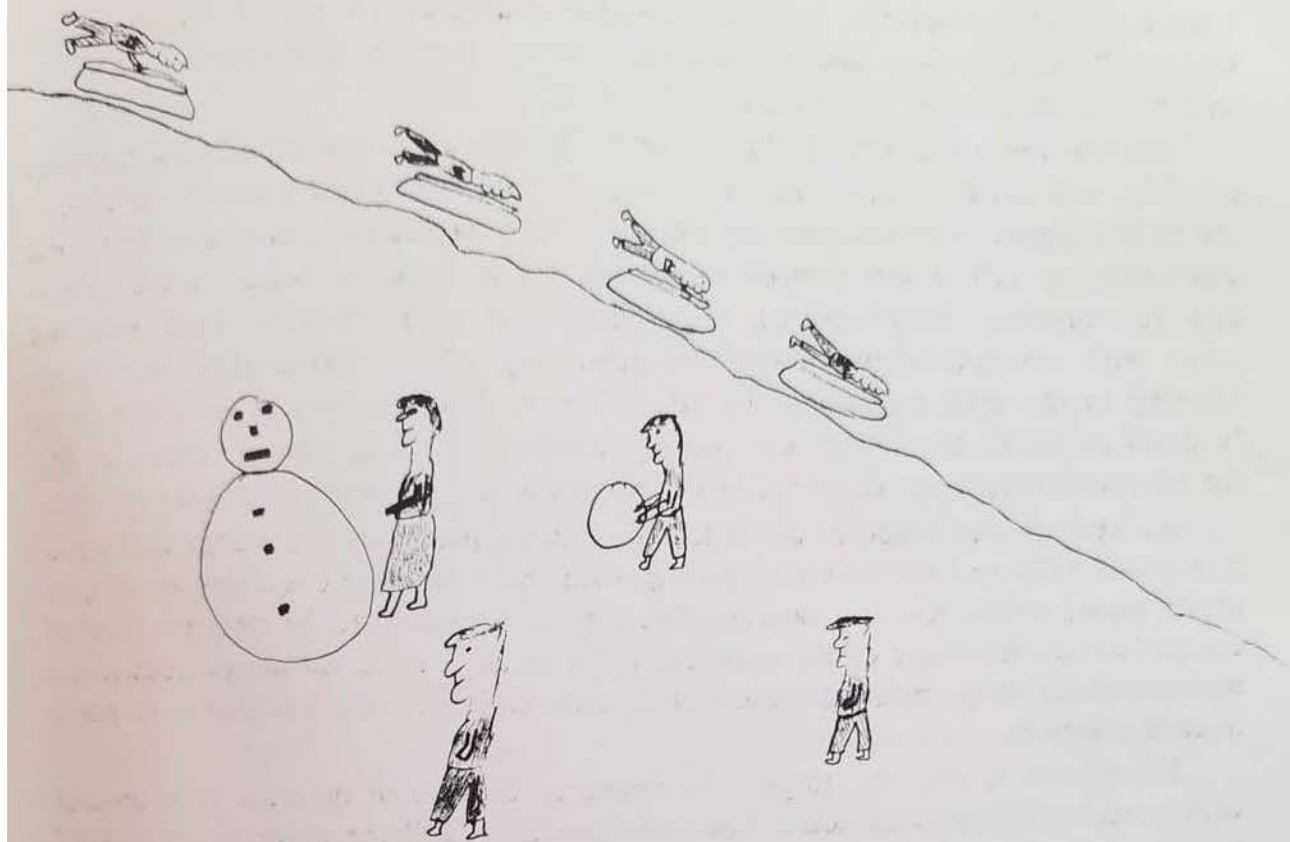
The test was scored in two parts. In the 35 questions that referred to direct anxiety, each YES response was scored as positive. In the 11 questions (Sarason's lie score) which refer to covert anxiety, each NO response was scored as positive.

(ii) *Tests of figure drawing.* The child was asked to draw from memory a clock face with the hands at 10 past 9, to copy a sketch of a bicycle, and to copy a sketch of a cube. These tests were included as a consequence of Zangwill's (1960) work on the relationship between brain damage, aphasia and constructional apraxia. The items in the test were chosen so that some normal children tested would fail, for ability to draw in three dimensions (the cube) is only achieved at about the age of 9. The items were scored as failed if the child could not demonstrate the cube as being three-dimensional, could not demonstrate the bicycle's proper relationships of wheels, handlebar and seat, or could not demonstrate the relationship of the numbers round the perimeter of the clock face (see Fig. 8 p. 80).

(iii) *Tests of right/left discrimination.* The tests of right/left discrimination were adapted from Benton (1960). The children were asked to look at a series of sketches of a figure facing them and say which hand was pointing to which side of the body. The items on this test were again selected so that a small proportion could be expected to fail, for ability to perceive the more difficult of these relationships is still being acquired at the age of 9 years. The test explored the child's ability to identify right and left sides of the body, to understand that people facing one have undergone a relative shift in handedness, and to grasp the idea that a hand carried across the body retains its original sidedness. Points were given for the demonstration of each of these concepts. This test, like the previous two, was completely non-verbal and placed no pressure upon the child's ability to talk (see Fig. 9 p. 81).

(iv) *Raven's Controlled Projection Test.* In the Controlled Projection Test (Raven 1951), the child constructs a story in response to standardised questions. The questions in the test are designed to produce information about the child's relationships with peers and with parents, about the content of his fantasies, fears, worries, dreams and hopes for the future. During the test the child is requested to draw, which provides more a release from the interview than a source of clinical material. Items on the test were not scored directly but were used as clues to be explored in more detail during the less structured portion of the interview. These drawings had character and variety and could be the subject of a study themselves (Figs. 6 and 7).

(v) *Free interview with the child.* This was originally meant to be a non-directive interview in which the child would be free to talk about whatever he wished. In the pilot study it became evident that 10-year-old children are seldom able to maintain this type of interview for more than a few minutes and some form of structure would be required. The behavioural *pro forma* of Gesell (1946) was adapted to provide a reasonable format. Each section of the interview began with a general



Figs. 6 and 7. Two drawings made by children while completing the Raven's Controlled Projection Test.

question which invited the child to talk; for example 'Tell me about yourself at school'. When the child had finished responding, a more structured format was used to prompt discussion of the particular item.

The interview covered the following areas: participation in games, hobbies, indoor activities, and social groups. The aim of this section was to gain some knowledge of the child's leisure activities and his ability to find satisfaction in them. The child was invited to talk about himself at school, his attitude, activities, achievements and relationships. Relationships with peers and with teachers were explored along with concepts of the purpose of schooling. Considerable time was spent listening to the child talk about his life at home. After the general enquiry about 'yourself at home' the activities of eating, sleeping, bathing and dressing, caring for his room, accepting household tasks and pocket money were investigated.

An attempt was made to evaluate the child's concept of the things that upset him emotionally and his means of dealing with them. Specific enquiries were made about anger, worry, fear and sadness. These items appeared to be near the level of comprehension for many of the children, and, instead of a free-flowing discussion, it was more usual to get rather definite and concrete examples of behaviour in response to each question.

In contrast to this, the 10-year-old seems to be able to describe relationships with parents, siblings and peers. Thus, the question 'Tell me about your mother' was usually well responded to, and then, with help, expanded to cover her likes and dislikes generally, and more particularly the child's concept of her love for him.

A similar enquiry was made about the father and about the other siblings in the family. An enquiry was made about the number of friends the child had, about the times they played together, the nature of the relationship and of the child's feeling as to whether or not these friendships were adequate or satisfactory.

A summary of the information obtained from the child was then made as a descriptive essay. The following items were coded on rating scales before the mother was seen, so that the information, for these items at least, came solely from the child:—

- Item 54 The general anxiety scale for children.
- Item 55 Figure drawing.
- Item 56 Right/left discrimination.
- Item 57 Child's anxiety at interview.
- Item 58 Child's interpersonal relationships.
- Item 59 Child's school attitude.
- Item 60 Child's pattern of activities and interests.

3. *Psychometric Testing of the Child*

The following battery of psychological tests was employed.

- (i) *The Weschler Intelligence Scale for Children*. This began with the performance sub-tests of the scale, the picture arrangement, picture completion, block design, and coding sub-tests being used. The verbal sub-tests followed; those used included information, comprehension, arithmetic, similarities, and vocabulary. I.Q.'s for each child were calculated on the basis of these five verbal and four performance sub-tests.

It was decided to omit the object assembly sub-test because of the time involved, but after embarking upon the survey proper, it was found that there was time for an additional short test and the digit span sub-test was chosen. This, although a useful sub-test, would have been better omitted and the object assembly sub-test, because of its high saturation with performance factor, used instead.

The performance sub-tests preceded the verbal, in order that the children with severe stutters would be functioning, at least initially, in a non-verbal situation. This was thought to be particularly important because of the feeling that verbal test scores may be reduced by the stutterer's communication handicap.

(ii) *Laterality tests.* **HANDEDNESS.** Note was taken of the hand used by the child in writing. A ball of paper was then tossed to the child and he was asked to throw it into a basket; the hand used for throwing and catching was noted. The child was then asked to unscrew and rescrew the top on a bottle. The hand doing the rotating was again noted. Verbal enquiry about handedness followed these tests.

EYEDNESS. A cardboard cone was used, sufficiently large at one end to cover both the child's eyes, narrowing to an inch diameter at the other end. The child was asked to stand at a distance holding the cone at both ends and look at a pencil held by the psychologist. The eye visible through the narrow end of the cone was noted as the sighting eye.

(iii) *The Benton Visual Retention Test.* Form C of the Benton Visual Retention Test was administered, using a 10-second exposure of each of the 10 designs and asking for immediate recall from memory of the designs. The result was scored (1) as the total number of designs correct out of the possible ten and (2) the total number of errors. In scoring, instructions in the Benton Manual were followed.

(iv) *Schonell Reading Tests.* The graded reading vocabulary test was used and the total number of words read correctly was recorded and converted to a reading age for each child. Since the ages of the children tested ranged over 30 months, a reading quotient was calculated. It was felt that the comparison between the two groups of children would be facilitated by such a measure, and that this advantage would outweigh the limitations of the use of the standardised reading quotient. The Schonell Silent Reading Test A, a 9-minute silent reading test with written single-word answers, was then administered. It was scored from Schonell's norms and converted into manageable data in the same way as the graded vocabulary reading test.

In co-operation with the Department of Psychology of the London School of Economics, it was proposed to administer to each child an inventory of anxieties and fears. During the survey it became obvious that many of the children of even average intelligence could not comprehend the written questionnaire and its use was limited to only 50 cases. Those children who could manage it, did so well and apparently meaningfully, and it would seem to be a promising method of investigation for use in similar surveys, but preferably with children of 12 to 14. Because of the large number of children who were unable to complete this inventory, results were of little practical significance for this investigation.

4. *Mother's History of the Child's Development with Particular Reference to Speech*

At the beginning of the clinic session, while the child was being seen by the

psychiatrist, the mother was interviewed by the speech therapist. This interview was structured and aimed at eliciting details of developmental history. Detailed enquiry was made about pregnancy, the circumstances of the birth, the passing of milestones and the development of habits of feeding, sleeping, and bladder and bowel control. Specific details were requested about the child's previous medical history. The mothers were exceedingly co-operative, for this was the information that they had thought the interviewer would require; but it must be remembered that most of the events about which information was sought had occurred 7 to 12 years previously, and the information may not be particularly reliable.

A detailed enquiry was then made about the child's speech development, the age at which phrases were first used and the length of time and quality of fluent speech before the child began to stutter. The onset of stuttering, its nature and subsequent development were explored along with the family's attitude to the problem—then and now. Specific enquiry was made about the presence of defective speech at any age. In the control children similar interviews were carried out in which enquiries were made about the occurrence of non-fluencies in early speech, and the family's attitude to them when they did occur. Finally the speech therapist enquired in turn about family histories of twinning, left-handedness and stuttering. Considerable emphasis was placed upon this last question and as much information as possible was obtained about each relative who was said to have stuttered.

5. Mother's Personal and Psychiatric History

At the conclusion of the interview with the speech therapist each mother was given Form C of the Cattell 16 Personality Factor Inventory and asked to complete it before she saw the doctor. A significant proportion of mothers, particularly those with stuttering children, were unable to complete the test. In a few cases this was because they were unable to read the fine print of the manual, but in the majority of cases it was because their intellect was too limited to comprehend the meaning of the questions. A few mothers were frankly illiterate. Accordingly, results obtained from this test were not as useful as had been hoped and were unsuitable for use in the major computations.

The mother's session with the psychiatrist consisted of an interview about the family, herself and her child. As an introduction to the interview it was explained that a child could be understood best in terms of his family and environment and that it was proposed to begin by asking about herself and her home. This being a survey, the mothers were invited to withdraw from any questions that they found to be too personal or too searching, or indeed, to feel free to terminate the interview at any time. Fortunately none did so.

The interview began with the gathering of census-type data about the mother's place of birth, her age at marriage, age at birth of child, her job prior to marriage, and her own father's job. The husband's birthplace and age at the time of marriage were also ascertained—as was his current job, whether he found it satisfactory, whether there were prospects of promotion, and whether the mother found that she could manage on the money that came in. A list of the children in chronological order was obtained, and enquiries were made about the structure and functioning of the

family group. Enquiries about the number actually living at home, other relatives living-in, about the housing situation and the mother's satisfaction with her circumstances were made. The way in which joint family responsibilities were shared, and the leisure time activities that the family pursued together and apart were investigated. Finally, it was noted whether they felt they were a close-knit family, and what they felt was the major handicap to their efficient functioning as a family unit.

A detailed personal psychiatric history of the mother was then taken. This covered the following areas:—

- Her parents, their nature, health and relationship to her;
- Her childhood, being away from home, presence of neurotic traits and her general health;
- The atmosphere in her parental home and her relationship with her siblings;
- Her achievement at school, her relationships with the teachers, and her attitude to schooling in general;
- Her work record, length of time jobs were held and reasons for leaving each;
- Her interests and leisure-time activities in her adolescence;
- Her menarche and the growth of her interest in the opposite sex. How she met her husband, how long they courted, and the family's attitudes to their marriage and the subsequent course of her marital adjustment;
- Her husband, his temperament, his nature, and his relationship with the children;
- Her medical history of physical and psychiatric illness and the use of medicines, tobacco and alcohol;
- Her level of personality functioning, relationships with relatives, friends and authority, her religion, her social activities, and her aspirations, ambitions and concepts of the purpose of her life;
- Her moods, anxieties and emotional stability, her confidence especially in regard to her house and her family.

This whole interview lasted about an hour. Although it followed in the main a structured framework, whenever possible it became free and non-directive as the mother began to talk about things that were important to her.

If the technique of psychiatric interview is to obtain results which are an improvement on pencil and paper questionnaires, then flexibility is the advantage of the interview that must be exploited. In many cases the mother was very productive and the interviewer was required to add little in the way of direction, but with some mothers, particularly the less intelligent, the interview at times degenerated into a simple question-and-answer situation.

At the conclusion of the interview a detailed check list of neurotic traits was scanned, and if information on any of the items had not been forthcoming, it was then specifically requested.

The mother then completed the Maudsley Personality Inventory (M.P.I.). In a few cases, particularly for those who were nearly illiterate, the test was verbally administered. While the mother was completing the M.P.I. a summary of her psychiatric history was recorded, with a formulation of her neurotic traits and present mental health.

4. *Mother's Account of the Child's Emotional Adjustment*

The child's personal history was then obtained from the mother. This interview began with an open invitation to 'talk about the child'. The usual response was a very valuable description of the child's habits and temperament and his relationships within the family, in the space of about 200 words. This was recorded verbatim. Specific enquiries were made about the child's early days at school, his later attitudes and achievements, and the mother's aim with regard to schooling and future occupation. An enquiry was made about the child's friends, their nature, number and type and about the nature of the relationship. Specific enquiry was made about the occurrence of periods of difficult behaviour, their origin and nature, and the method by which they were handled within the family.

Attention was paid to methods of discipline used by the mother and by her husband. The child's present maturity level was discussed following the areas already covered with the child. Finally, enquiry was made about the presence or absence of behaviour disorders. The list of behaviour disorders and the criteria for their assessment was adapted from McFarlane *et al.* (1950). Some 20 items were coded. Their description and rating scales will be found in the next chapter.

Although information about each item came from the mother, it must be realised that the child had already been seen, so that the rating of any particular trait is unavoidably tempered by the interviewer's prior evaluation of the child. In this way it was hoped to avoid the defensiveness that colours the data from mothers of highly anxious children. This, too, was the reason for beginning the interview with a long detailed psychiatric history, for it was hoped that, by the time the child was discussed, the mother's defensiveness would, in large part, be dissipated. At the conclusion of this interview, another essay-type summary was made of the personality and behaviour of the child. Before doing this, an invitation was extended to the mother to raise any further problems that she wished, about the child, the purposes of the survey, or the conduct of the interviews.

At the conclusion of the clinic session, which had lasted some three to three-and-a-half hours, the family's expenses were reimbursed from the survey funds.

The statistical methods used to handle the data will be described in conjunction with the reports of results. In Chapter 5 the differences between the groups of stutterers and control children are evaluated, and in Chapter 6 the variations within the group of stutterers themselves are explored.

Survey of Stuttering in Schoolchildren

Differences between Stuttering and Non-Stuttering Groups of Children

The Recording and Analysis of Information

Information about biological variables is difficult to handle satisfactorily, both because of the absence of scales which measure the variables and because of lack of agreement about the definition, description and meaning of the variables themselves. For any progress to be made, it is necessary to make a number of empirical decisions on these matters. Many such decisions were made before the start of the clinic phase of this survey, 96 variables being defined and rating scales constructed. Practice in their use was obtained in the pilot studies, and where possible both the definitions and the rating scales were related to other established work in the field.

Each item scored is fully discussed when the results are presented. The items fell into the following categories:—

The child's home and family	15 items.
The mother's personal history, psychiatric state and personality test results	25 items.
The child's development with special reference to speech ...	14 items.
The child's psychiatric state	32 items.
Psychometric test results	9 items.

Although the division between mother, home and child reflects the time allotted at the clinic to the particular enquiry, within each category there was a strong tendency to score the easily observable and measurable data rather than the more difficult and diffuse data about standards, values and relationships.

At the end of each clinic session, the case histories of each mother and child were completed and the data transferred in numerical form to record cards. The case histories and the cards were then filed and not reopened until the end of the total survey. The rapid pace of the survey, the random order in which controls and stutterers were seen and the immediate filing of all data meant that the investigators were able to form no conclusions about a particular trend in any of the variables in either the stuttering or control groups.

At the end of the clinic phase of the survey when all children and their parents had been seen, results were tallied manually for each item. Simple intergroup comparisons were made, and the significance of such differences as were revealed were evaluated by the Chi squared test. In order that each cell in the table should contain adequate numbers, it was usual to compress the data into brief tables in which normal was compared with abnormal, or ideal with non-ideal. The methodology of the data analysis utilizing the Pegasus computer will be discussed later in the chapter.

In each of the succeeding 10 sections the summary of results will serve to introduce the section, describe its scope and present the results. This will be followed by a detailed description of each item with the coding scale used to score the information, the results for the two groups, and the significance, if any, of the difference. The more important items will be accompanied by a list of other items with which they correlate significantly. From this it is possible to obtain a better idea of the meaning and scope of each item. Correlations for most of the items will be found in the appendix. The sections deal in turn with the family and home environment, the mother's personal and psychiatric history, the child's development, speech, emotional adjustment, and psychological and electroencephalographic test results.

The Families

1. *The Family Characteristics*

The seven family characteristics were assessed from the data supplied by the mother. They were concerned with social class and social mobility, mother's age at marriage and at birth of the child, father's age, family size and sibling rank.

None of these seven items revealed significant differences between the experimental and control groups.

Social class was evenly distributed between the two groups. This finding may be a function of the method of selecting the controls. Compared with the proportion of the total population of the city in each social class at the 1951 census, stuttering was more prevalent in Social Classes IV and V.

The age differences between parents were also evenly distributed between the groups, and there was no suggestion that stutterers occupied an unusual place in sibling rank.

(1.)* *Social class*

Information on the occupation of the father was obtained during the interview with the mother. Social class was rated using the Registrar General's classification, and was based on the father's occupation or on the mother's occupation if the father was non-existent and she was working.

There is no difference in the distribution of social class between the two groups—Table 3. This is not unexpected, for the two groups were already partially matched

TABLE 3

<i>Social Class</i>	<i>Stutterer</i>	<i>Control</i>
S.C. I	4	3
S.C. II	8	10
S.C. III	39	41
S.C. IV	11	11
S.C. V	18	15
TOTAL	80	80

* Numbers set in Univers type-face denote the coding numbers for each item.

TABLE 3A

<i>Census Comparison</i>	<i>Stutterer</i>	<i>Census</i>
	N = 80	N = 109895
S.C. I	5%	3.3%
S.C. II	10%	12.7%
S.C. III	49%	56.4%
S.C. IV	14%	11.7%
S.C. V	22%	15.9%

for social class by attending the same local school. If the stutterers are compared with the city population at the time of the 1951 census, then the distribution of social class is different from that prevailing in Newcastle at that time—Table 3A. But this difference is not significant at the 5 per cent level.

The significant findings on this item for the 80 stutterers were that low social class correlated negatively with upward social mobility, positively with poor housing, mother's low I.Q., child's low I.Q., and poor reading ability.

(2) *Social mobility*

An attempt was made to assess social mobility by making a comparison of the maternal grandfather's social class at the time of marriage with the family's current social class rating.

The family was noted as having upward social mobility when the social class had improved; static, where there had been no change, and downward where the family was of a lower social class. Results are shown in Table 4.

TABLE 4

<i>Social Mobility</i>	<i>Stutterer</i>	<i>Control</i>
Upward social mobility	19	20
Static social mobility ...	38	39
Downward social mobility	16	18
Not known	7	3
TOTAL	80	80

Amongst the 80 stutterers the only significant correlation of upward social mobility was with high social class.

(3) *Mother's age at marriage*

In order to avoid problems of divorce and remarriage this item refers to the mother's age when she married the father of the propositus. The results (Table 5), showed an apparent tendency for stutterers' mothers to marry younger than control children's mothers but this was not significant ($X^2 = 1.5$) when the mothers marrying under the age of 20 were compared with the rest.

TABLE 5

<i>Mother's Age at Marriage</i>			<i>Stutterer</i>	<i>Control</i>
Under 20	...	...	26	19
20-24	...	...	34	34
25-29	...	...	14	17
30-34	...	...	5	6
35 and over	...	...	1	4
TOTALS			80	80

TABLE 6

<i>Mother's Age at Birth of Propositus</i>			<i>Stutterer</i>	<i>Control</i>
Under 20	...	...	4	4
20-24	...	...	22	20
25-29	...	...	18	18
30-34	...	...	25	20
35-39	...	...	6	11
40 and over	...	...	5	7
TOTALS			80	80

(4) *Mother's age at birth of propositus*

In this set of data (Table 6) there is a tendency for more stutterers to be late-born children. When those born to mothers over the age of 35 were compared with those born to mothers under that age, X^2 was only 1.7, and therefore the difference is not significant.

(5) *The father's age relative to the mother's*

TABLE 7

	<i>Stutterer</i>	<i>Control</i>
Father younger than mother	...	...
Father 0-5 years older than mother	9	13
Father 6 or more years older than mother	52	53
Not known	18	14
	1	—
TOTALS	80	80

There appeared to be no difference in the distribution of the age of the fathers between the two groups.

There was none when this was related to the mother's age, as in Table 7, and this remained so even when the father's actual age was considered.

(6) *The number of children in the family*

The number of children in the family included living children of this marriage and step-children if they had been at home during the life of the child. Step-children who had never lived in the house with the survey child were excluded (Table 8).

TABLE 8

<i>Number in Family</i>	<i>Stutterer</i>	<i>Control</i>
One child	8	3
Two or three children ...	33	44
Four to six children ...	31	27
Seven or more	8	6
TOTALS	80	80

If the two- or three-child family is taken as the average family and the other units of family size are compared with this, then the difference, that stutterers tend to come from non-average families, approaches a level of significance, Chi squared being 3.0. The actual number of children in the families of the two groups is similar, there being 278 children in stutterers' families and 284 children in the control families.

TABLE 9

<i>Sibling Rank</i>	<i>Stutterer</i>	<i>Control</i>
Only child	8	3
Eldest child	18	23
A middle child	31	20
Youngest child	23	34
TOTALS	80	80

(7) *Sibling rank*

This included all children coded in item 6 and the results are displayed in Table 9.

A further division was made to identify 'para-only' children, i.e. those whose nearest sibling was more than 10 years older or more than 5 years younger. There were four such children in the stuttering group and 8 in the control group so that the distribution of only and 'para-only' children together was nearly identical in the two groups.

TABLE 10

<i>Sibling Gap</i>	<i>Stutterer</i>	<i>Control</i>
(a) Mean number of years between child and first born ...	7.0	7.25
(b) Mean number of years between child and preceding child	3.7	4.5
(c) Mean number of years between child and succeeding child	3.4	2.7
(d) Family 'space' = b + c ...	7.1	7.2

There is an identical number of first-born children (only and eldest) in each group. The only trend in this information on sibling rank is that there appear to be more middle children who are stutterers. This trend is not significant at the 5 per cent level, ($X^2 = 2.9$).

Nevertheless, it seemed important to explore the data with regard to Rotter's (1939) suggestion that 'stutterers tended to be isolated in the family, there being a larger sibling gap between them and other children than there was for the remaining siblings'. Therefore these calculations were made and the results displayed in Table 10. The differences revealed do not indicate that there is a larger sibling gap surrounding the birth of stutterers, for the hiatus in the family into which they fit is 7.1 years in the case of the stutterers and 7.2 years in the case of the control children.

2. Home Environment

Data from the interview with the mother was coded in an attempt to define aspects of the child's home environment. The four items coded—intactness of family, quality of joint family life, housing, and relationships with the extended family group, although not such factual data as the previous section, may well have had a considerable influence upon the emotional and physical development of the child.

On each of the indices there is a definite trend for the families of stutterers to fail. They often fail to obtain adequate living conditions, they fail to stabilise their marital relationship, they fail to provide an optimal home atmosphere for the child, and they fail to relate in a healthy manner with those outside the family. Three of the items are significantly different at the 10 per cent level and one at the 5 per cent level, but as all are in the same direction their importance should become more obvious in the results of the factor analysis.

(9) One-parent home

The scale used for rating this information was:—

1. Two-parent home: mother and father always present.

2. Temporary one-parent home: a home which had been broken but with subsequent re-marriage was now a two-parent home. Cases in which the parents were living together, but the child was regularly boarded out with relatives, were included in this group. Also included were cases in which, although the marriage was intact, one parent was chronically ill in hospital.
3. One-parent home: one parent is missing through death, desertion, divorce, separation, or illegitimacy.

TABLE 11

<i>Home</i>	<i>Stutterer</i>	<i>Control</i>
Two-parent home ...	63	71
Temporarily one-parent	6	7
Permanently one-parent	11	2
TOTALS	80	80

The trend in this data is that more stutterers come from broken homes. Comparing one-parent families with stable families the result is not significant, X^2 being 2.3. Unfortunately, as the numbers involved are so small, it is not possible to assess the significance of the apparent increase in permanently broken homes amongst stutterers.

In the total material, one-parent home was correlated significantly with poor family life, inadequate housing, disturbed relationships with extended family group, husband's abnormal personality, abnormal birth circumstances in the child, late development of speech, enuresis, temper tantrums, low intelligence, low reading quotient and stuttering.

(10) *Adequacy of family life*

Adequacy of family life was coded from information obtained mainly from the mother, although the children contributed useful facts. Adequacy concerned the compatibility of the parents, the joint family activities, the sharing of responsibility within the family, and the common interests enjoyed by its members.

The following criteria for coding were used:—

1. Good family life: happy, united and interested parents, activities in which all members of the family joined, and strong loyalties within the family which spread to include relatives.
2. Fair family life: parents who, although too busy, preoccupied, old, or ill, were nevertheless quite well disposed towards the children, there being a considerable degree of unity within the home, but little interest taken by the parents in the activities of the child outside the home or at school. Those cases in which there was an appreciable degree of marital conflict between the parents, who were yet quite united about the children, were included in this group.

3. Poor family life: in these cases the parents were not united. There were few or no joint activities or interests, poor family cohesion and loyalty. Included were cases in which there was severe incompatibility between parents, and frank mental illness in one or both.

TABLE 12

Family Life			Stutterer	Control
1. Good	...	...	37	48
2. Fair	...	...	31	22
3. Poor	...	...	12	10
TOTALS			80	80

This result appears to demonstrate that fewer stutterers come from homes in which there is good family life, but this result fails to reach a significant level ($X^2 = 2.5$).

Poor family life correlated significantly with many items of poor achievement, low ability and neuroticism in both mother and child.

In this monograph the term neuroticism is expanded from the concept as defined by Eysenck to include the presence of neurotic traits, personality disorder and neurosis. It is taken to be a graded phenomenon stretching from illness to health and thus affecting behaviour to a greater or lesser extent.

(11) Housing

Housing, besides offering a crude indication of the environment in which the child was raised, also reflects the family's ability to obtain adequate housing in competition with the rest of the community. Note was taken of the housing during the life of this particular child. An adequate house was assessed as one in which the children after infancy were able to sleep apart from the parents.

TABLE 13

Housing			Stutterer	Control
1. Adequate	...	...	48	63
2. Inadequate at times during child's life			25	10
3. Always inadequate	...		7	7
TOTALS			80	80

When these results were assessed by comparing those in whom housing had always been adequate, with those in whom housing had been inadequate, the result was significant at .05 level, X^2 being 6.1. The environmental matching that was implicit in the selection of controls would, it is suggested, have tended to minimise this difference.

Poor housing correlated significantly with one-parent home, disturbed relationships with extended family group, mother's poor school record; and, in the child, aggression, temper tantrums, low intelligence and low reading quotient.

(12) *The extended family group*

The extended family group item was an attempt to consider how the mother in particular, but also the family generally, were able to relate to the child's grandparents, aunts and uncles. The nature of the relationship, and behaviour such as the frequency of visits, were usually considered. In the few cases in which relatives lived out of the city, attitudes rather than behaviour had to be assessed. The information was sub-divided into three categories in accord with the following criteria:—

1. Family dependent upon the extended family group: relatives support the family in various essential ways, either with money or, more frequently, with constant help and reassurance.
2. Satisfactory inter-dependence between the family and relatives: there is friendly regular contact with mutual help and interest between both groups.
3. Family is isolated from relatives: unwilling to or uninterested in seeing them, with little or no personal contact.

TABLE 14

<i>Relationship with Extended Family Group</i>			<i>Stutterer</i>	<i>Control</i>
Dependent	...	...	19	11
Inter-dependent	...	...	50	60
Isolated	...	...	11	9
TOTALS			80	80

If it is assumed that normal mental health is congruent with the second possibility then this, when compared with the other two groups, suggests that stutterers' families do not have particularly healthy relationships with their extended family group. The results, however, do not achieve significance at the 5 per cent level ($X^2 = 2.5$).

In the total material, dependent or isolated relationships with the extended family group correlated significantly with one-parent home, poor family life, inadequate housing, mother's poor school record, mother's poor work record, husband's abnormal personality, mother's neuroticism, and mother's low intelligence. It also correlated significantly with late and poor talking in the child.

The Mothers

1. *Personal History*

Personal history was obtained during the psychiatric interview with the mother and subsequently coded. The items concerned the normality of the maternal grandparents and the adequacy of the family life in which the mother grew up. Her emotional adjustment in childhood and in adolescence, her school and work record,

the growth of her sex interest, the personality of her husband, and her previous medical history were investigated.

The personal histories of the mothers in the two groups were remarkably similar in regard to the adequacy of their own parents and homes, their childhood and adolescent development, and their own and their husbands' sexual maturation. They appeared to have suffered similar physical illnesses.

On two related items, school achievement and work history, there were significant differences between the two groups. The mothers of stutterers tended to score poorly in these areas, both differences being significant at the 5 per cent level. It seems reasonable to suppose that this apparent tendency to fail could also be related to the failure to provide an adequate home environment for the child, which was demonstrated in a previous section. The common aetiological factor behind this general failure to cope could be either neuroticism or low intelligence, and these fields will be explored in the next section.

(13) *The maternal grandparents*

TABLE 15

<i>Maternal Grandparents</i>	<i>Stutterer</i>	<i>Control</i>
Both normal	39	46
One abnormal	34	29
Both abnormal	3	4
Not known	4	1
TOTALS	80	80

If the grandparents had suffered from psychiatric ill health, psychopathy or chronic physical illness resulting in prolonged hospitalisation, or if they had been permanently absent from the home owing to death, desertion or divorce before the mother was 14, it was considered that this could have had an adverse affect on the mother's emotional development. Accordingly such cases were coded as abnormal and the results are in Table 15. There appeared to be no real trend in this information, the numerical differences being non-significant. The cases in which information could not be scored on this item were those in which the father was seen instead of the mother.

TABLE 16

<i>Maternal Family Life</i>	<i>Stutterer</i>	<i>Control</i>
Good	36	41
Fair	28	30
Poor	12	7
Not known	4	2
TOTALS	80	80

(14) *Adequacy of mother's own family life*

An attempt was made to code the mother's report of the nature of her own family life both in regard to her relations with her parents and her siblings and in regard to the general atmosphere which prevailed in the home. The scale used was similar to item 9. The results, shown in Table 16, showed no difference between the two groups.

(15) *Mother's childhood emotional adjustment*

On the basis of an enquiry about the presence of anxiety, fears and other neurotic disturbances in childhood, an attempt was made to assess her childhood adjustment using the following criteria:—

1. Good: an adequate, confident happy child.
2. Fair: a variable child, with difficulties and anxiety, but never completely incapacitated.
3. Poor: Incapacitated by anxiety or other neurotic symptoms.

There is no suggestion (Table 17) that mothers of stutterers differed from control mothers in childhood with respect to the presence of neurotic symptoms.

TABLE 17

<i>Mother's Childhood Personality</i>				<i>Stutterer</i>	<i>Control</i>
Good	...	...	...	37	37
Fair	...	...	...	28	30
Poor	...	...	...	10	12
Not known	...	...	...	5	1
TOTALS				80	80

TABLE 18

<i>Nature of Mother's Adolescence</i>				<i>Stutterer</i>	<i>Control</i>
Good	...	...	...	34	35
Fair	...	...	...	30	34
Poor	...	...	...	10	9
Not known	...	...	...	6	2
TOTALS				80	80

(16) *Mother's adolescence*

An enquiry was made as to the interests, activities and satisfactions which were

enjoyed by the mother during her adolescence, and the information was coded in the following way:—

1. Good: many friends, interests and activities.
2. Fair: a few interests and friends and rather routine activities.
3. Poor: limited interests and activities, bound to the home, unhappy and isolated.

There was no suggestion that the mothers of stutterers had had a more unsatisfactory adolescence than had the mothers of control children.

(17) *Mother's school record*

This was coded in the following manner, and the results are displayed in Table 19.

1. Good: near the top of the school, with or without subsequent education. Enjoyed and appreciated school.
2. Average: left school aged 14, had tolerated it and made satisfactory progress, but really neutral in attitude, being quite pleased to leave.
3. Poor: low scholastic achievement and poor behavioural adjustment, unhappy, glad to leave as soon as permissible.

TABLE 19

<i>Mother's School Record</i>				<i>Stutterer</i>	<i>Control</i>
Good	...	...	...	17	29
Average	...	...	...	32	35
Poor	...	...	...	27	15
Not known	...	...	...	4	1
TOTALS				80	80

The trend in this information is that the mothers of stutterers have had rather more difficulty in their school career intellectually and perhaps emotionally than did the control mothers. A Chi squared test of this trend reveals it as significant at the 5 per cent level, Chi squared being 4.5.

Within the total material, a mother's poor school record correlated significantly with a poor family life, inadequate housing, poor relationships with extended family group, poor work record, husband's abnormal personality, neuroticism and low intelligence. It also correlated with late and poor talking in the child, failure on tests of right/left discrimination, extreme modesty, low intelligence, low reading quotient, and with stuttering.

(18) *Mother's work record prior to marriage*

The detailed work history was coded in the following manner:—

1. Good: a steady and happy employee who held a single job throughout, or only moved to another job to obtain promotion, thereby retaining the goodwill of her previous employers.
2. An average work record: a person who was content in her job and was regarded as a satisfactory worker. Made job changes for adequate reasons.

3. Poor: a person who had been restless in employment, with frequent job changes, often as a result of difficulties with the employer.
The results are shown in Table 20.

TABLE 20

<i>Mother's Work Record</i>				<i>Stutterer</i>	<i>Control</i>
Good	...	...	...	22	33
Average	...	...	...	38	39
Poor	...	...	...	17	7
Not known	...	...	...	3	1
TOTALS				80	80

The trend of this information is in the same direction as that obtained from the mother's school record, namely that the mothers of stutterers tend to have had a poor and unsatisfactory work history. When those with a poor work record are compared with the other two groups this trend is significant at the 5 per cent level, Chi squared being 4.4.

Significant correlations of mother's poor work record within the total material were with poor school record, abnormal maternal grandparents, poor relationships with extended family group, and poor family life. It also correlated with husband's abnormal personality, mother's neuroticism, mother's low intelligence, poor talking in the child, poor school attitude, anti-social behaviour, disobedience, low intelligence, low reading quotient, and finally with stuttering.

(19) *Sexual maturation*

Information about the development of interests in the opposite sex was coded in the following manner:—

1. Good: boyfriends in adolescence, good courtship and satisfactory marriage.
2. Fair: low sex interests, rather routine courtship, but nevertheless satisfactory marriage.

TABLE 21

<i>Mother's Sexual Maturation</i>				<i>Stutterer</i>	<i>Control</i>
Good	...	...	...	36	33
Fair	...	...	...	28	32
Poor	...	...	...	11	14
Not known	...	...	...	5	1
TOTALS				80	80

3. Poor: an inhibited adolescence with no boyfriends, which was followed by an unusual courtship often resulting in a frigid marriage.

There appeared to be no significant differences in the sexual maturation between the two groups. The results are displayed in Table 21.

(20) *Husband's personality*

The specific information was quantified as follows. Where marital irregularities existed, the person deemed to be the 'husband' was the person who now acted in the role of father to the child.

1. Normal: a husband who appears mature, loyal, supportive and compatible.
2. Unsatisfactory: a husband who, although uninvolved with the family or home, and prone to be rather irritable with no particular interest in the children, nevertheless supports and maintains the family in a satisfactory manner.
3. Abnormal: a husband who presents psychiatric or conduct problems destructive to family functioning.

The results may be seen in Table 22.

TABLE 22

<i>Husband's Personality</i>	<i>Stutterer</i>	<i>Control</i>
Normal	49	55
Unsatisfactory	15	16
Abnormal	14	9
Not known	2	—
TOTALS	80	80

(21) *Mother's previous medical history*

Information about past physical illness was coded according to the following schedules:—

1. Normal: only minor and childhood illnesses.
2. Mild: illness which required the attendance of her general practitioner or which called for an acute hospital admission.
3. Serious: illness which had meant long term hospitalisation, risk to life or prolonged chronic incapacity at home.

TABLE 23

<i>Mother's Medical History</i>	<i>Stutterer</i>	<i>Control</i>
Normal	39	47
Mild illness	21	14
Serious illness	16	19
Not known	4	—
TOTALS	80	80

The results (Table 23) showed that the two groups gave similar histories of physical illness.

2. *Personality of the Mothers*

The section on personality is an important one, for it contains items about disablement by neuroticism (as defined on pp. 56), past and present, and the particular personality traits evident in the interview. These are essentially negative ways of assessing personality, so items referring to contentment and sociability were included. These correlated highly with the former and returned similar results. Structured personality inventories were also included and one of these contained an assessment of the mother's intelligence.

The significant finding derived from the items concerned with the mother's mental health is that the mothers of stutterers appear to be no more and no less neurotic than the mothers of non-stuttering children. This assessment is supported by the mother's accounts of an equal incidence of neurotic difficulties in childhood, adolescence and early married life, by the absence of any difference in the distribution of individual neurotic traits between the two groups, and by the results of the structured personality tests.

This is an important finding, for neuroticism in a mother is likely to be an important determinant of neuroticism and behaviour disorder in a child. If the mothers of stutterers are no more neurotic than the mothers of non-stutterers, this raises important theoretical problems regarding the origin of stuttering as an emotional disorder.

The other important finding in this section is that more mothers of stutterers than expected are of below average intelligence. This is congruent with the previous items about home environment and school and work history, for they failed to cope in the home, at school or at work. These findings could be a function of the mothers' low intelligence, now that neuroticism *per se* does not appear to have been an especially important determinant. All these items certainly correlate significantly with low intelligence.

(22) *Previous psychiatric history*

Psychiatric illnesses which appeared as discrete episodes of at least two months' duration were included in this item. Long-term personality problems were not

TABLE 24

<i>Previous Psychiatric History</i>			<i>Stutterer</i>	<i>Control</i>
Normal ...	...	...	33	37
Mild illness	...	...	21	23
Severe illness	...	...	23	19
Not known	...	...	3	1
TOTALS			80	80

included unless their course had been marked by an episode of neurotic decomposition which appeared to the patient as the time 'her nerves were bad'.

Information was coded as follows:—

1. Normal: never troubled by 'nerves'.
2. Mild: discrete neurotic episode, often reactive to bereavement or stress, with spontaneous recovery.
3. Severe: neurotic or psychotic illness that resulted in incapacity.

There were no appreciable differences in the psychiatric histories of the two groups of women, as may be seen from Table 24.

(23) *Present mental health (Neuroticism)*

A rating of impairment of mental health necessarily involves the theoretical framework within which the rater operates. To the authors such a diagnosis is the product of many considerations.

Firstly, and of most importance, is the presence of anxiety, neurotic traits and other psychiatric symptoms.

Secondly, is the extent to which the person is unable to form healthy emotional inter-personal relationships and cannot achieve satisfaction in her activities, interests and work.

Thirdly, is the loss of the sense of well-being, of equanimity and the occurrence of the 'dis-ease' that accompanies this change.

This global variable was assessed as follows:—

1. Stable: either no neurotic traits evident, or such minor neurotic traits as are present result in no limitation or incapacity, the person being able to love and work, causing no distress to herself or others.
2. Handicapped: limited in work, activities or interests, or in ability to form inter-personal relationships because of neurotic traits which result in mild distress to herself or to others. In other words, although these traits impair her ability to love and work they are compatible with continuing function.
3. Disabled: for these people the 'dis-ease' has reached the level of a personality disorder, a neurosis, or psychosis with marked symptoms and definite disability.

The results of this item may be seen in Table 25.

TABLE 25

<i>Present Mental Health</i>			<i>Stutterer</i>	<i>Control</i>
Stable	...	...	42	46
Handicapped	...	...	22	21
Disabled	...	...	13	12
Not known	...	...	3	1
TOTALS			80	80

There were no differences between the two groups of mothers when they were assessed according to the above criteria of mental health. It is interesting that, of the two groups of mothers of 10- and 11-year-old children, 56 per cent could be regarded as stable, 28 per cent regarded as handicapped to a degree by neurotic traits, and 16 per cent as frankly disabled by psychiatric symptoms. The inventory of psychiatric traits which was the major component of the previous item was then broken down into its respective parts.

(24) *Schizoid traits*

These were coded according to the following criteria:

1. None.
2. Presence of schizoid traits such as coldness, aloofness, suspiciousness, or apathy.

The results obtained are in Table 26 and show no intergroup difference.

TABLE 26

<i>Schizoid Traits</i>	<i>Stutterer</i>	<i>Control</i>
Normal	66	73
Schizoid traits	10	6
Not known	4	1
TOTALS	80	80

(25) *Cycloid traits*

These were assessed according to the following criteria:—

1. Normal.
2. Cycloid traits of cheerfulness or despondency unrelated to circumstances.

TABLE 27

<i>Cycloid Traits</i>	<i>Stutterer</i>	<i>Control</i>
Normal	64	65
Mild	12	14
Not known	4	1
TOTALS	80	80

There were no significant inter-group differences.

(26) *Obsessionality*

The following lists of neurotic traits were adapted from those used by Gurney (1962). Obsessionality was assessed on the following check-list of obsessional features.

1. High standards in work and punctuality.
2. High moral standards.
3. Preoccupation with order and tidiness.
4. Rigidly governed behaviour.
5. Poor adaptability.
6. Frequent check rituals.
7. Caution, thrift.
8. Difficulty in making decisions.
9. Abnormally health-conscious.

Items from this list were rated in the following way:—

1. Normal: not obsessional.
2. A few features present but without incapacity.
3. Sufficient prevalence of obsessional features either in frequency or in severity to constitute a personality disorder or neurosis.

There was no trend for mothers of stutterers to be more obsessional than control mothers. This is in contrast to the suggestions of Moncur (1951) and Johnson (1955) that mothers of stutterers are hypercritical perfectionists.

TABLE 28

<i>Obsessionality</i>	<i>Stutterer</i>	<i>Control</i>
Normal	54	49
Traits only	17	28
Personality disorder or neurosis	6	2
Not known	3	1
TOTALS	80	80

(27) *Hysterical features*

The check list used to assess these was as follows:—

1. Attention seeking, self-display.
2. Floridity of expression and gesture.
3. Extravagant ambitions.
4. Evanescent enthusiasms.
5. Fabrication or exaggeration.
6. Shallow, egocentric emotional responses.
7. Exploitation of others' emotions.
8. Possessiveness.

They were coded in the same manner as the obsessional features, and the results

TABLE 29

<i>Hysterical Features</i>	<i>Stutterer</i>	<i>Control</i>
Normal	67	68
Traits only	8	9
Personality disorder or neurosis	2	2
Not known	3	1
TOTALS	80	80

are displayed in Table 29. There was no difference in distribution of hysterical traits between the two groups.

(28) *Anxiety features*

These were assessed using the following check list:—

A: *Anxiety features proper*

1. Inability to relax.
2. Worries easily.
3. Becomes anxious when faced with responsibility.
4. Is preoccupied with unlikely dangers.
5. Marked anticipatory anxiety before events.
6. Marked vasomotor responses.
7. Lack of confidence.

B: *More formal neurotic features*

8. Free floating anxiety.
9. Phobias.
10. Depersonalisation.
11. Neurotic depression.

These items were coded as follows:—

1. Normal: not anxiety-prone.
2. Anxiety-proneness in the sense of a few features being present, but no frank incapacity.
3. Anxiety features of sufficient frequency or severity to constitute an anxiety neurosis, phobic anxiety depersonalisation syndrome, or neurotic depression.

There was no significant difference between the two groups (Table 30).

TABLE 30

<i>Anxiety Features</i>	<i>Stutterer</i>	<i>Control</i>
Normal	46	41
Anxiety prone	21	29
Neurosis	10	9
Not known	3	1
TOTALS	80	80

(29) *Psychopathic features*

These were notoriously difficult to elicit within the interview situation but the following check list was used as an aid:—

1. Low standards of work and punctuality.
2. Low moral standards.
3. History of unscrupulous behaviour.
4. Inability to learn from experience.
5. Impulsive, foresightless behaviour.
6. Frequent evasive behaviour.
6. Delinquent or criminal behaviour.
8. Alcohol or drug addiction.
9. Dishonesty.

These were coded in the following way:—

1. Normal: not psychopathic.
2. Few features present, but contributing no real disadvantage to the family.
3. Frank psychopathic features.

The results show that there is no trend in the distribution of traits between the two groups.

TABLE 31

<i>Psychopathic Features</i>	<i>Stutterer</i>	<i>Control</i>
Normal	70	69
Mild	6	10
Marked	1	0
Not known	3	1
TOTALS	80	80

(30) *Emotional immaturity and dependence*

The following check list was used to assist ratings on this item:

1. Easily moved and upset.
2. Low frustration tolerance.
3. Impatience and irritability.
4. Frequent day-dreaming.
5. Dependence on relatives.
6. Dependence on familiar environment.
7. Easily fatigued.
8. Poor persistence.
9. Hypochondriasis (unassociated with anxiety).

These were coded in the usual way:—

1. Normal.
2. The few traits present do not incapacitate.

3. Sufficient frequency or severity to constitute an immature and dependent personality disorder, or frank neurasthenia or hypochondriasis.

There appeared to be no difference in the distribution of immature and dependency features between the two groups, as may be seen from the table.

TABLE 32

<i>Immaturity</i>				<i>Stutterer</i>	<i>Control</i>
Normal	...	...	...	49	54
Mild	...	...	...	21	21
Marked	...	...	...	7	4
Not known	...	...	...	3	1
TOTALS				80	80

(31) *Contentment*

In order to provide a contrast to the recording of psychiatric features which necessarily deal with negative aspects of the personality, the mothers were rated according to the following scheme regarding contentment with their circumstances.

1. High: the mother felt that her child, home, husband and self were all functioning well, and thus she in turn was contented.
2. Medium: she felt one of these four aspects of her life to be wrong or in need of adjustment, but by and large she felt that hers was an acceptable and rewarding life.
3. Low: she felt more than one of these aspects to be wrong, and she expressed herself as actively discontented.

From Table 33 it may be noted that there is no difference in the degree of contentment between the experimental and control group mothers. It is also interesting that the percentage distribution, 54 per cent pleased with their life, 31 per cent contented, and only 15 per cent actively discontented, should parallel the proportions judged to be stable, mildly and severely neurotic.

Although they are not always present in the same individuals, contentment and neuroticism do correlate 0.64. Lack of contentment also correlates significantly with one-parent home, poor home atmosphere, mother's poor work history, and mother's low I.Q. (This is taken from the correlation matrix constructed for the mothers of stutterers alone. The complete matrix is in the appendix).

TABLE 33

<i>Contentment</i>				<i>Stutterer</i>	<i>Control</i>
High	...	...	...	40	43
Medium	...	...	...	22	26
Low	...	...	...	14	10
Not known	...	...	...	4	1
TOTALS				80	80

(32) *Sociability*

An attempt was made to assess the nature of each mother's social relationships from data obtained from questions about her attitudes to relatives and friends and her participation in clubs and social activities. Specific enquiries were made as to the frequency of outings of a social nature in which she participated. This information was coded according to the following schema:—

1. Good: regular and frequent contact with adult friends and relatives, or regular attendance at social clubs.
2. Fair: intermittent contact with adult friends and relatives, but few outings or visits.
3. Poor: minimal contact. Mothers remote or withdrawing, with no adult friends and infrequent or negligible social outings.

The results are shown in Table 34. The tendency for the mothers of stutterers to be less gregarious was not statistically significant.

TABLE 34

<i>Sociability</i>				<i>Stutterer</i>	<i>Control</i>
Good	...	...	...	29	36
Fair	...	...	...	32	29
Poor	...	...	...	16	14
Not known	...	...	...	3	1
TOTALS				80	80

Personality Test Results of Mother

(33) *The Maudsley Personality Inventory (M.P.I.):*

This test (M.P.I. 1959) measures the individual's position on two dimensions of personality: extraversion to introversion, and neuroticism to non-neuroticism. The test was administered at the conclusion of the mothers' psychiatric interview. A few mothers were not able to understand the meaning of the questions and in these cases the test was abandoned.

TABLE 35A

<i>Extraversion Scale</i>				<i>Stutterer</i>	<i>Control</i>
Under 22	...	...	...	30	34
22-28	...	...	...	20	16
Over 28	...	...	...	21	29
Not known	...	...	...	9	1
TOTALS				80	80
Mean Score E Scale	...			23.7	23.9

TABLE 35B

<i>Neuroticism Scale</i>			<i>Stutterer</i>	<i>Control</i>	
Under 25	...	...	36	38
25-34	...	...	20	29
Over 34	...	...	15	12
Not known	...	...	9	1
TOTALS			80	80	
Mean Score	N	Scale	...	24.5	24.0

Neither of the scales showed any significant intergroup difference. It is difficult to compare the distribution of scores obtained in this survey with those obtained by Eysenck, because of the position effect that occurs when a structured personality test is placed in the middle of a psychiatric interview. Because it was in a constant locus within the survey, the results (Table 35A and B) can be compared on an inter-group basis.

(34) *Cattell 16 Personality Factor Inventory*

This was administered to the mothers prior to the psychiatric interview. Thirty-one of the stutterers' mothers and 18 of the controls' mothers did not complete the test, because they either did not understand its nature or else could not read the small print of the manual. The scores of the 49 mothers of stutterers and 62 mothers of control children who completed the test were compared, and no significant differences emerged on any of the 16 factors.

Factor B, which concerns the intelligence of the mothers, approached significance at the 5 per cent level, ($X^2 = 4.8$, $df = 2$).

As a result of this, an effort was made to utilise other information on the mothers' intelligence. During the actual interview, a rating of each mother's intelligence as high, average or low was recorded. Factor of B the Cattell 16 P.F. Test was re-rated using the interview rating, for the intelligence of those mothers who did not complete the 16 P.F. form. (It was the only item in the survey to be rated retrospectively). The following were the results obtained:—

TABLE 36

<i>Intelligence of Mothers</i>			<i>Stutterer</i>	<i>Control</i>
Above average	...	...	13	11
Average	...	...	43	57
Below average	...	...	24	12
TOTALS			80	80

There are significantly more mothers of below average intelligence in the experimental group. This is significant at the .05 level, Chi squared being 4.4.

Within the total material, this item, mother's low intelligence, correlated significantly with the following features: poor family life, poor relationships with extended family group, abnormal maternal grandparents, mother's poor school record, mother's poor work history, husband's abnormal personality, late and poor talking of the child, modesty and disobedience, and, of course, the child's low intelligence and low reading quotient.

The mothers of stutterers demonstrated their tendency to fail to cope in providing an adequate home environment for their children. Earlier, it will be remembered, they had suffered a relative failure in their school and work history. This tendency to fail could have been due, broadly speaking, to two general factors. The first, neuroticism, does not appear to have played much part in their difficulties. The second, low ability, is probably a sufficient explanation for the common occurrence of failure to cope with school, work and the home.

The Children

1. *The Early Development of the Children*

This section contains data on the age, height and weight of the two groups of children. It also covers their obstetric history and their acquisition of the physiological habits of eating, sleeping, and toilet training. The children's medical histories are also compared. The acquisition of first phrases and the presence of developmental articulatory defect are compared and finally the presence of positive family histories of stuttering, twinning and left-handedness are discussed.

The developmental data was obtained in the interview with the mother, but its reliability is an open question as it depended upon the accuracy of recall of events that took place 7 to 12 years previously. It was felt that these items were important and that, as the degree of error was likely to be similar in both groups, intergroup comparisons could be made.

The children in the two groups were of the same age and sex and had equivalent heights and weights. They had suffered similar illnesses and encountered similar problems in the development of their physiological habits. A notable finding was that adverse circumstances were more common than expected at the birth of the children who stuttered. Because of the retrospective nature of the information this finding is to be accepted with considerable caution.

An expected finding which is consistent with other work in the field was that stutterers were some four months retarded in the acquisition of first phrases, and that, when they did talk, considerably more of them suffered from articulatory defects, usually of a developmental nature. Stutterers, then, tend to be 'late and poor' talkers, both findings being significant at the 1 per cent level.

The interesting finding that more stutterers would be expected than have similarly affected relatives was very highly significant (p less than .0001). This result is presented in detail in Chapter 7 when the genetics of stuttering are discussed.

(35) *Age*

The control children were matched with the stutterers for age and for sex. This pair matching for age was precise, the stutterers ranging in age from 110-140 months

with a mean of 126.96 months, the control children ranging in age from 112-141 months with a mean of 126.12 months. There is no significant difference between the means or distribution of ages in the two groups. Although the children when seen had an age range of 30 months, their birth dates were spread over only 24 months. The survey took 6 months to complete, and thus the original age range $9\frac{1}{4}$ - $11\frac{1}{4}$ became $9\frac{1}{4}$ - $11\frac{3}{4}$ years with a mean of $10\frac{1}{2}$ years.

(36) *Height and weight*

The children were measured with their shoes on. Stutterers ranged in height from 4 ft. to 5 ft. 6 ins. with a mean of 4 ft. 7 ins., and the control children varied from 4 ft. 1 in. to 5 ft. 1 in. with a mean of 4 ft. 7 ins.

In weight, stutterers varied from 60 lb. to 140 lb. with a mean of 86 lbs., the control children varied from 58 lbs. to 120 lbs. with a mean of 84 lbs. The estimations of weight were made in the clothes in which the children attended the clinic.

(37) *Circumstances surrounding the birth of the children*

Detailed enquiry into these circumstances was made and the answers were grouped according to the following criteria:—

1. Normal.
2. Abnormal:—
 - (a) Labour was precipitate (under half-an-hour) or unduly prolonged (over 30 hours).
 - (b) Complicated by severe illness during pregnancy in the mother.
 - (c) Abnormal delivery such as a caesarean section, forceps delivery or abnormalities of lie.
 - (d) Abnormality in the child such as birth weight under 5 lb. (prematurity) or other definite history of neonatal morbidity requiring treatment.

The results are presented in Table 37.

TABLE 37

<i>Abnormal Perinatal Circumstances</i>	<i>Stutterer</i>	<i>Control</i>
Normal	43	59
Abnormal	29	19
Not known	8	2
TOTALS	80	80

There appears to be a marked trend for the circumstances surrounding the birth of stutterers to be abnormal, but when the significance of the difference is tested Chi squared equals 3.7, which just fails to reach the .05 level of significance.

This finding on the birth history of stuttering children is interesting. In an endeavour to clarify this rather mixed bag of 'perinatal abnormality', we extracted those cases in which there seemed to be a good indication that the child itself had suffered rather drastically at the time of birth. There were 9 stutterers and 3 control children so defined, and these figures were used for the multiple regression calculations upon the total group of cases.

Developmental difficulties prior to the age of 5 years

With regard to feeding, sleeping and toilet training, the mother described the manner in which she carried out these activities with the child, rather than the chronological development. The disadvantage of the long recall required must be borne in mind in the interpretation of the results.

(38) Feeding difficulties

These were characterised as follows:—

1. Normal.
2. Abnormal in that the child had had a prolonged period of failing to thrive when a baby or was a problem feeder when an infant or a toddler.

(39) Sleeping difficulties 0-5 years

These were characterised as follows:—

1. Normal.
2. Abnormal in that the child had been a poor and irregular sleeper requiring special management.

(40) Toilet training

Information was rated according to the following scheme:—

1. Normal.
2. Abnormal in that the child was very late in gaining initial bowel control, or had gained it and then relapsed for a prolonged period.

The results of each of these items are presented in Table 38.

There were no trends or significant differences in the developmental history of the two groups in regard to feeding, sleeping and toilet training. The sparseness of reported difficulties is probably a product of the difficulty of recall.

TABLE 38

		<i>Stutterer</i>	<i>Control</i>
Feeding difficulties	Normal	73	76
	Abnormal	5	3
	Not known	2	1
Sleeping difficulties	Normal	71	73
	Abnormal	7	6
	Not known	2	1
Toilet training	Normal	66	66
	Abnormal	12	13
	Not known	2	1

(41) Previous medical history

After enquiring about the common infectious diseases of childhood, there was a specific enquiry for a history of the following illnesses: epilepsy, head injury, brain infection, other C.N.S. disorder, presence of congenital deformity, presence of chronic illness. The results are presented in Table 39. All children had experienced

infectious diseases. Other diseases seemed to be evenly distributed between the two groups.

TABLE 39

<i>Previous Medical History</i>	<i>Stutterer</i>	<i>Control</i>
Infectious diseases of childhood	80	80
Epilepsy	0	0
Head injury requiring admission to hospital	1	1
Meningitis, encephalitis ...	0	0
Other C.N.S. disorder	0	0
Congenital deformity	3	0
Chronic illness	4	6

(42) *Development of speech (Late talking)*

Great care was taken to try to relate the age of reported onset of speech to various environmental happenings in the family life, and, by cross checking, to endeavour to make this data more reliable. From Table 40 it may be seen that there is a distinct difference in the mean age of onset of first phrases between the two groups, stutterers being retarded by about 4 months in the acquisition of speech. The finding that stutterers are late talkers was highly significant at the 0.01 level ($X^2=11.2$). This difference is probably an under-estimate rather than an over-estimate. It is consistent with other reported data on the development of the speech of stutterers (Berry and Eisenson 1956, Morley 1957).

TABLE 40

<i>First Phrases: Age in Months</i>	<i>Stutterer</i>	<i>Control</i>
Under 18	11	23
18-23	32	39
24-29	23	13
30-35	5	0
36 and over	7	1
Not known	2	4
TOTALS	80	80

(43) *History of abnormal articulation*

According to their mothers a considerable proportion of the stutterers had much more than the usual difficulty in learning to articulate correctly. The cases recorded as having a history of abnormal articulation were the children who, even after they had sufficient vocabulary, still could not be understood because of their defective articulation or 'poor talk'.

From the results in Table 41, it may be seen that there is a tendency for stutterers not only to be late talkers, but also to be poor talkers. The difference is highly significant at the 0.01 level ($X^2=8.1$).

TABLE 41

<i>History of Abnormal Articulation</i>			<i>Stutterer</i>	<i>Control</i>
Not present	...	...	54	70
Present	...	...	23	8
Not known	...	...	3	2
TOTALS			80	80

Amongst the stutterers, poor talking was seen to correlate significantly with severe stuttering, presence of blocks, history of late talking, no intelligible speech before stuttering, prior speech therapy, anti-social behaviour, low reading quotient and errors on figure drawing and right/left discrimination.

Three items about family history of stuttering, left-handedness and twinning are grouped in this section.

(51) *Family history of stutter*

The family history of stutterers was of considerable interest, and the detailed results of this and other investigations with different case material will be presented in the chapter on genetics. The table below shows that the stutterers had many more affected relatives than would be expected, and that in half the cases the stutterer had had no direct contact with the affected member of the family.

TABLE 42

<i>Family History of Stutter</i>			<i>Stutterer</i>	<i>Control</i>
No family history	...	...	50	77
Positive family history but without direct contact with this child	...	...	13	1
Positive family history and prolonged contact between the affected member of the family and this child	...	...	17	—
Not known	...	...	—	2
TOTALS			80	80

The control children had fewer relatives that stuttered than expected, for on the population frequency one would have expected about 5 per cent to have positive family histories.

Thirty-eight per cent of the stutterers had similarly affected relatives—a very highly significant result, Chi squared being 32.8.

Within the total material a family history of stuttering correlated only with the presence of stuttering. Within the 80 stutterers a family history of stuttering was significantly more frequent amongst the girls who stuttered. It did not correlate with any of the other items measured in this material.

The small trend for twinning to occur more often in stutterers' families (Table 43) is not significant. Likewise there is no difference in the incidence of reported left-handedness in the families of the two groups (Table 44).

TABLE 43

<i>Twinning</i>	<i>Stutterer</i>	<i>Control</i>
No history of twinning in families	61	67
Positive family history of twinning	19	11
Not known	—	2
TOTALS	80	80

TABLE 44

<i>Family History of Left-Handedness</i>	<i>Stutterer</i>	<i>Control</i>
No left-handedness	48	52
Left-handedness reported in direct relatives	32	26
Not known	—	2
TOTALS	80	80

2. *The Child at Interview*

This section reports in a very limited way the psychiatric interviews with the children, for it is exceedingly difficult to quantify the information they gave about themselves, their school life and their families.

The items selected for rating include scores on tests of anxiety, figure drawing, right/left discrimination, anxiety within the interview, adequacy of the child's interpersonal relationships, and the child's school attitude. His activities and interests were also quantified and noted upon appropriate scales.

If anxiety is the currency of emotional disorder, then it is important to evaluate the former carefully when assessing the latter. Of the two measures of anxiety presented in this section, one a structured test, and the other a rating of the child's behaviour at the interview, neither showed differences between the experimental and control group children.

An emotionally healthy child can establish good interpersonal relationships and can find satisfaction in his school work, whatever his level of achievement. Having

done both these things, he has sufficient energy left over to be interested in many outside activities and pursuits. Using the rating scales, these areas were evaluated.

The same numbers of children in each group were rated as having good, fair or poor interpersonal relationships. In contrast, the stutterers, at almost a significant level, found themselves with increased problems at school. This could be due to emotional disorder, intellectual handicap, or, in their case, to the problem posed by their stutter, for 80 per cent had independently mentioned school as the situation where their stutter was worst. The first alternative is unlikely, for participation in activities and interests outside school seemed to be equally satisfactory for both groups of children.

The tests of special abilities related to the child's neurological competence showed that stutterers tended to fail in copying drawings and identifying right and left sides of figures. This could be indicative of either a specific ability handicap, or of a lowering of general intelligence within the group. It could also be a product of the learning situations found in their adverse social environment.

The results are consistent with the details of late and poor talking described in a previous section and are likely to be related, with them, to similar aetiological factors. The absence of unusual anxiety in the stutterers, and their failure on tests of ability, is congruent with the pattern of their mothers' performance, for here too, although there was a definite impairment in their ability to cope, there was no increase in neuroticism.

(54) *The G.A.S.C.*

(a) *Anxiety score.* This test was done at the start of the interview with the child. While the upper scores appear to be confined to highly anxious children, the lower scores do not represent low anxiety, for extremely low scores are seen in children with a great deal of overt anxiety, and the optimum scores on this test lie in the middle range.

(b) *The lie score.* This item, which covers questions of common experience for all children, is scored in the reverse direction to the overt anxiety score so that negative responses indicate abnormality.

TABLE 45A

<i>G.A.S.C. Anxiety Score</i>				<i>Stutterer</i>	<i>Control</i>
0-4	...	...	...	6	4
5-9	...	...	...	6	13
10-14	...	...	...	18	14
15-19	...	...	...	22	22
20-24	...	...	...	17	15
25-29	...	...	...	8	12
30-34	...	...	...	3	—
TOTALS				80	80

TABLE 45B

<i>'Lie' Score Total</i>				<i>Stutterer</i>	<i>Control</i>
0-2	...	...	...	16	25
3-5	...	...	...	35	27
6-8	...	...	...	21	19
9-11	...	...	...	8	9
TOTALS				80	80

The results of both sections may be seen in Table 45A and B. Whichever way the results are grouped, anxiety, as revealed by the two divisions of this test, appears to be evenly distributed between the experimental and the control groups.

(55) *Figure drawing*

This item was designed to test for constructional apraxia. The subject was asked to draw a clock and to copy a bicycle and a cube (see Fig. 8). The results are recorded in Table 46. The trend for stutterers to make errors in such tests just fails to reach significance at the 5 per cent level ($X^2 = 3.2$).

Within the total material, errors on tests of figure drawing correlated significantly with being a girl, mother's low intelligence, late and poor talking, tests of right/left discrimination, enuresis, over-activity, anti-social behaviour, aggression, irritability and disobedience, and very highly with low intelligence, low reading quotient, and a high W.I.S.C. scatter.

TABLE 46

<i>Figure Drawing</i>				<i>Stutterer</i>	<i>Control</i>
Drawings all correct	...	...	...	53	64
One error	...	...	...	24	16
Two or three errors	...	...	...	3	—
TOTALS				80	80

(56) *Right/left discrimination*

By the use of this test it is possible to explore a child's concept of sidedness and his ability to manipulate this concept. It is a test of orientation in space, and failure is related by Benton (1959) to brain damage in children. As administered there were three sub-tests (see Fig. 9).

Stutterers tended to make more than one error in this test, and the results were significant at the 5 per cent level, Chi squared being 3.8 (Table 47).

TABLE 47

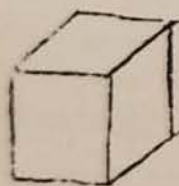
<i>Right/Left Discrimination</i>				<i>Stutterer</i>	<i>Control</i>
All correct	...	...	...	44	49
One error	...	...	...	18	23
Two errors	...	...	...	9	6
Three errors	...	...	...	9	2
TOTALS				80	80

Here is a drawing of a boy who is looking at you.
Write "left" by his left hand.



Please copy the next two drawings.

Our Model



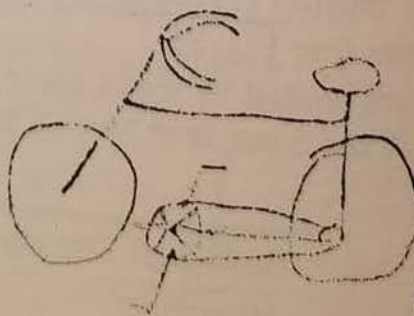
Your Drawing.



Our Model



Your Drawing



I.Q. 117

Fig. 8. Figure-drawing: failure to draw a cube.

Complete the sentences below writing in either the word "left" or the word "right".



Q. Which hand is on which ear?

A. The Right hand is on the Left ear.

X



Q. Which hand is on which eye?

A. The Left hand is on the Right eye.

X



Q. Which hand is on which eye?

A. The Right hand is on the Right eye.

X I.Q. 104

Fig. 9. Failure in right/left discrimination.

Within the total material, failure on this item correlated significantly with mother's poor school record, mother's low intelligence, late and poor talking, errors on figure drawing, disobedience, low intelligence, low reading quotient, and a high scatter.

(57) *Anxiety evident at interview*

This was rated on the following scale:—

1. Normal: child sits quietly and looks relaxed, appearing to deal with the interview to the best of his ability.
2. Mild: a child who fidgets, needs reassurance and is hesitant in completing some tests, or in talking about some activities.
3. Marked: child who is frankly distressed by the interview, inhibited in making responses, avoids any spontaneous contribution and expresses anxieties either directly or via the Raven's Controlled Projection Test.

There were no differences between the two groups in the amount of anxiety that was evident during the psychiatric interview.

TABLE 48

<i>Anxiety at Interview</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	41	42
Mild	...	...	28	27
Marked	...	...	11	11
TOTALS			80	80

(58) *The child's interpersonal relationships*

Information on this topic was gained from both the Raven's Controlled Projection Test and from the less structured but more direct interview. This information was then recorded to conform with the following rating scale:—

1. Normal: a child with good relationships with peers and family.
2. Some problems: the child has rather a restricted circle of peer friendships or has difficulties with one or the other parent.
3. Disturbed: the child has severe difficulties with one parent, or both parents or with his peers; avoids friendships and is unable to achieve any satisfactory relationship.

TABLE 49

<i>Interpersonal Relationships</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	50	50
Problem	...	...	26	27
Disturbed	...	...	4	3
TOTALS			80	80

The results are reported in Table 49 and show that there was no difference

in the quality and nature of the interpersonal relationships between the experimental and control groups of children.

(59) *Child's school attitudes*

During the interview the children found it easy to talk about their school, their attitudes and their concept of its purpose. They talked freely about their likes and dislikes in subjects, and about their relationships with their teachers and other pupils. This information was coded in accordance with the following rating schedule.

1. Normal: child likes attending school, appreciates its purpose and feels he is succeeding. Has no particular difficulties with teacher or pupils.
2. Some problems: child is neutral about school and although he may have difficulties with work, teacher or pupils, is able to make a satisfactory adjustment.
3. Disturbed: child dislikes school, is frankly unhappy there, appears to be failing in the work and has severe problems with teachers or pupils. Outside intervention and help is probably required.

The results are shown in Table 50. From this it may be seen that stuttering children regard themselves as having more difficulty in making a satisfactory school adjustment than do the control children. This trend just fails to be significant at the 5 per cent level, Chi squared being 3.65.

Within the total material, a poor school attitude was seen to correlate significantly with poor family life, abnormal maternal grandparents, mother's poor work record, and mother's neuroticism. In the child it correlates with poor peer relationships, over-activity, anti-social behaviour, irritability, temper tantrums, low intelligence and stuttering.

TABLE 50

<i>School Attitudes</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	50	62
Some problems	...	...	23	15
Disturbed	...	...	7	3
TOTALS			80	80

(60) *The child's pattern of activities and interests*

During the interview the child discussed his outdoor and indoor activities, his participation in clubs, and his interest in reading, radio, television or the movies. It was easier for the 10-year-old to discuss what he actually did than why he liked doing it. Information was scored according to the following rating scale:—

1. Normal: a child who has a wide range of activities and interests, is eager for new experiences and quite capable of creating his own play situations.
2. Limited: a child who is restricted to conventional play within a rather definite circle of activities, disliking unstructured situations or novel experiences.
3. Abnormal: a child whose interests are markedly restricted, or tend to be focussed on rather unusual and solitary pursuits. The child actively avoids co-operative play and, having no rewarding interests, is confined to the home.

TABLE 51

<i>Activities and Interests</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	59	66
Limited	...	...	19	12
Abnormal	...	...	3	2
TOTALS			80	80

The results are given in Table 51. There appears to be little or no difference in the manner in which the two groups of children find satisfaction in their activities and interests.

3. *The Child's Emotional Adjustment*

The next 25 items concern the relationships of the child with his family and the occurrence of symptoms of behaviour disorder. They were scored on rating scales which were mainly derived from the work of Macfarlane *et al.* (1950). The data for making these ratings was obtained from the mothers, although, as the child had already been seen, the scores were probably influenced by the interview with the child. These data then should properly be viewed as pooled data from mother and child.

The first series of items concerns the child's interpersonal relationships with his mother, father and peers. The rating scales of behaviour disorder then follow. The first group, dreams, enuresis, encopresis, appetite and modesty are perhaps physiological behaviour disorders. The next behaviour disorders to be rated are overactivity, anti-social behaviour, obsessionality, aggression, dependence, sensitivity, timidity, shyness. Anxiety and fears are succeeded by ratings of disobedience, irritability, temper tantrums, jealousy and reserve. Many of these scales rate very similar behaviour although from a somewhat different aspect. They are descriptive rating scales and were not based on ideas of aetiology and thus have no need to be mutually exclusive.

The results, presented in tables item by item, showed that stutterers seemed to be able to form relationships with their parents and their peers in a comparable fashion to the control children. These data are consistent with the child's account of his own behaviour in this area. Ratings on the 20 behaviour disorder symptoms that are listed show no significant intergroup differences, stuttering children being just as, but no more, difficult or disturbed than children who don't stutter.

There are not even any trends present to suggest that had the numbers been greater a significant result would have been found. That one symptom approaches significance at the 5 per cent level may be immaterial, for in any 20 variables it is to be expected that chance variation would produce such a result. If the scores on all the 20 items are summed, then it may be shown that for every 27 stutterers who are rated as mildly or severely abnormal, there are 26 control children who were rated in a similar manner.

This result is consistent with our earlier failure to demonstrate an increase of neuroticism amongst the mothers of stutterers and our failure to show that children who stutter when seen in direct psychiatric interviews are different from a group of control children in regard to emotional disorder.

Thus, in these children, there appears to be no association between stuttering and the symptoms of emotional disorder.

It must be remembered that negative findings may arise not only when there is no actual difference between two groups, but also when the investigating techniques used are insensitive to such differences as do exist. This, of course, remains a possible explanation for the similarity of results in the two groups.

(61) *Mother/child relationship*

This information is limited by what could be gleaned at the interview. Mothers were often defensive, for this seemed to be their most sensitive area.

1. Normal: a warm and satisfactory relationship with no difficulties.
2. Some problems: in discipline, in expressing affection or in their demands on each other.
3. Disturbed: the child either rebellious or cold or hostile, to a degree regarded as problem behaviour. Rejecting or extremely over-protective mothers were included in this group.

The results are presented in Table 52. There was no difference between the two groups, for the relationship between stutterers and their mothers appeared to be no more and no less disturbed than expected. This is in contrast to the data presented by Moncur (1955).

(62) *Father/child relationships*

This was necessarily second-order information from the mothers, as the father

TABLE 52

<i>Mother/Child Relationship</i>				<i>Stutterer</i>	<i>Control</i>
Normal	...	...	...	56	59
Poor	...	...	...	22	18
Disturbed	...	...	...	1	0
<i>Father/Child Relationship</i>				<i>Stutterer</i>	<i>Control</i>
Normal	...	...	...	55	62
Poor	...	...	...	12	14
Disturbed	...	...	...	6	3
<i>Peer Relationships</i>				<i>Stutterer</i>	<i>Control</i>
Normal	...	...	...	57	51
Poor	...	...	...	19	21
Disturbed	...	...	...	4	8

was not interviewed. It was scored in the same manner as that of Item 61. Results are shown in Table 52 and again there are no obvious intergroup differences.

(63) *Peer relationships*

These were scored in accordance with the following rating scale:

1. Normal: child has common interests with peer group, is friendly and plays away from home freely.
2. Poor: child plays with a small group, avoiding new friends.
3. Disturbed: child refuses to play away from home, seems unable to make friends of his own age.

Results are displayed in Table 52. Both groups seem equally proficient in their ability to form relationships with peers.

These three items about interpersonal relationships reveal groupings and scores almost identical with those in item 58, the child's own account of his interpersonal relationships.

Rating scale of behaviour disorders in the children

Towards the end of the interview with the mother, after more general discussions about the child's activities, specific information was requested if it had not already been forthcoming, and the following rating scales were completed.

The first section comprises four items which, although often symptoms of emotional disorder, are yet closely related to the acquisition of control over physiological habits. In none of these four (dreams, enuresis, encopresis, or feeding disorders) were there significant intergroup differences at the age of 10 (Table 53). If the data had been taken at 5 there might well have been differences (as Glasner 1949, and others have suggested) in the prevalence of these disorders among stutterers.

Item 68 Modesty, the rating scales and results for which are presented in Table 53B, likewise showed no significant association with stuttering. Modesty is an interesting item, correlating at near zero levels with other behaviour disorder items yet correlating significantly with low intelligence in mother and child.

(69) *Over-activity*

Information was gathered about the presence of tics, nail-biting, thumb-sucking, fidgetiness, restlessness, distractability and short attention span. It is appreciated that whereas the majority of these disorders may be regarded as a consequence of anxiety, the extremely severe forms are more likely to be associated with hyperkinesis and the organic brain syndromes. It was deemed impossible in this survey to separate the two groups clearly. They were rated as follows:—

1. Normal: a child who, although quite active on occasions, can sit quietly without fidgeting if interested.
2. Fidgety: a child who is often restless with tension devices such as thumb-sucking, nail-biting, or tics, but can pause to concentrate if interested.
3. Over-active: a child who is hyperkinetic and distractable, cannot concentrate for long even if interested, and has great difficulty in being still on any and every occasion.

TABLE 53A

							<i>Stutterer</i>	<i>Control</i>
64 <i>Disturbing Dreams</i>								
None or very few dreams	...	...	...	...	...	...	43	39
Dreams twice a week, with some nightmares and disturbing dreams	...	...	...	...	...	...	35	35
Disturbing dreams at least once a week, with associated nightmares	...	...	...	...	...	...	2	6
65 <i>Enuresis, Day or Night</i>								
None	...	...	...	...	...	...	65	71
Rarely—less than once per month	...	...	...	...	...	...	7	5
Regularly—more than once per month	...	...	...	...	...	...	8	4
66 <i>Encopresis</i>								
Never	...	...	...	...	...	...	74	76
Rarely—less than once per month, perhaps frequent staining of underwear	...	...	...	...	...	...	6	4
Regularly—frequent	...	...	...	...	...	...	0	0
67 <i>Appetite</i>								
Normal—the child eats well, becoming hungry and enjoying food	...	...	...	...	...	...	66	60
Poor eater—a child who has firm dislikes and little apparent interest in food, but eats sufficiently to avoid this becoming a problem	...	...	...	...	...	...	12	16
Problem—the child avoids eating, has widespread dislikes which include staple foods. The mother caters specially and yet is often defeated	...	...	...	...	...	...	2	4

TABLE 53B

		<i>Stutterer</i>	<i>Control</i>
68 <i>Modesty</i>			
Normal—child undresses in front of parents and younger siblings, though may now exclude older siblings of the opposite sex	...	46	52
Modest—embarrassed to be seen undressed by parents or siblings, but accepts situations in which this occurs	...	23	24
Extreme—the child is never seen undressed by parents or siblings, taking elaborate precautions to ensure privacy	...	11	4

The results in Table 54 show that there is no significant difference in the distribution of these symptoms between the two groups.

TABLE 54

<i>Over-Activity</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	44	49
Fidgety	...	...	31	29
Over-active	...	...	5	2
TOTALS			80	80

(70) *Anti-social behaviour*

Detailed information was obtained about truancy from school, wandering from home, lying, stealing and destructiveness. Information was then coded according to the following scheme:—

1. None.
2. Some: definite sociopathic traits evident but behaviour remains acceptable within the particular culture.
3. Much: severe or frequent sociopathic disturbances which cause difficulties within the home or within the community.

The results, in Table 55, show that there was little or no difference between the two groups.

TABLE 55

<i>Anti-Social Behaviour</i>			<i>Stutterer</i>	<i>Control</i>
None	...	...	63	66
Some	...	...	12	12
Much	...	...	5	2
TOTALS			80	80

(71) *Obsessional traits*

Behaviour within the home or at school was categorised under the following headings: carefulness; tidiness; cleanliness; miserliness; extreme honesty; conscientiousness and love of order, in accordance with the following scale:—

1. Normal: such traits present intermittently, especially when the child remembers to be 'good'.
2. Some: one or more of these traits characterises the child but creates no problem.
3. Many: preoccupation with one or many of these activities leads to limitation, and to anxiety if the behaviour is threatened.

The results in Table 56 show no intergroup difference.

TABLE 56

<i>Obsessional Traits</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	54	50
Some	...	...	21	21
Many	...	...	5	9
TOTALS			80	80

(72) *Aggression*

This was found to be difficult to assess within the family, and our information is based on the child's interaction with his peers. It was coded in the following bipolar manner:

1. Passive: a child who will not fight and is distressed by conflict within the group, tending to withdraw.
2. Normal: a child who defends his own rights when they are transgressed but commonly avoids open fights.
3. Aggressive: a child who is always in strife or fights, quarrelling being his customary way of solving problems.

The results presented in Table 57 show no significant intergroup difference. ✓

TABLE 57

<i>Aggression</i>			<i>Stutterer</i>	<i>Control</i>
Passive	...	...	19	25
Normal	...	...	56	49
Aggressive	...	...	5	6
TOTALS			80	80

(73) *Dependence*

This was a measure of the child's maturity in establishing patterns of behaviour which were independent of his parents. It is rated in accordance with the following schema:

1. Normal: a child who is independent when on his own but will accept necessary help.
2. Moderately dependent: a child who prefers help with routine and needs considerable support and help in new situations.
3. Severely dependent: a child who not only requires considerable help with routine activity, but is virtually unable to do novel or solitary tasks.

The results are displayed in Table 58, and the apparent intergroup difference, that stutterers tend to be dependent, is not significant at the 5 per cent level ($X^2=2$).

Within the total material, dependence is seen to correlate significantly only with over-activity, irritability and temper tantrums. The correlation with stuttering is not significant.

TABLE 58

<i>Dependence</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	52	61
Moderate	...	...	24	16
Severe	...	...	4	3
TOTALS			80	80

(74) *Sensitivity*

This referred to the child's sensitivity to criticism and guidance, and was assessed as follows:—

1. Normal: a child who can act on his own judgment but takes criticism well.
2. Moderately sensitive: a thin-skinned child who pays too much attention to the opinions or criticisms or of others.
3. Severe: a child who is incapacitated by implied censure, quite often withdrawing from situations in which disapproval is present or anticipated.

✓ The result showed no difference between the two groups (Table 59).

TABLE 59

<i>Sensitivity</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	46	49
Moderate	...	...	29	30
Severe	...	...	5	1
TOTALS			80	80

(75) *Timidity*

This deals with the manner in which the child reacts to the external physical world and thus orientates his activities within it. The following bipolar rating scale was used to code this information:

1. Bravado: the child is foolish, taking many risks and often participating in daredevil activity, and appears to have no concept of danger, being quite foolhardy.
2. Normal: a child who plays freely, not being frightened by normal activities, but nevertheless is quite sensible about taking unnecessary risks.
3. Timidity: a child who is cautious, avoiding any rough play or dangerous activity, is openly afraid of being hurt and thus is limited in the normal childhood activities.

✓ There was no intergroup difference on this item (Table 60).

TABLE 60

<i>Timidity/Bravado</i>			<i>Stutterer</i>	<i>Control</i>
Bravado	...	...	4	2
Normal	...	...	61	68
Timidity	...	...	15	10
TOTALS			80	80

(76) *Shyness*

This was a rating of the child's behaviour towards adult visitors to the home, or with new groups of children such as are encountered on holidays.

1. Normal: child usually at ease socially.
2. Moderate: shy and awkward in large groups or with new adults, but soon overcomes it.
3. Severe: painfully shy with all new people and even some old and well-known friends and relatives.

The results are in Table 61 and show no intergroup difference.

TABLE 61

<i>Shyness</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	46	47
Moderate	...	...	31	29
Severe	...	...	3	4
TOTALS			80	80

(77) *Fears*

The enquirer asked what the child was afraid of rather than whether the child was fearful. A short list of fears (of dark, of heights, or of large animals etc.) was used in each case to begin the discussion, for it was found during the pilot surveys that the simple question 'What is the child afraid of?' elicits a very variable response

TABLE 62

<i>Fears</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	54	59
Moderate	...	...	23	21
Severe	...	...	3	0
TOTALS			80	80

unless some guide is extended. Results were rated according to the following scale:—

1. Normal: minor fears only, which are easily managed by the child.
2. Moderate: the presence of one or more fears which require actual management or support.
3. Severe: the presence of one or more fears limits the activities and incapacitates the child, leading to total irrational avoidance of various situations.

Again there is no difference in the distribution of the disorder between the two groups (Table 62).

(78) Anxiety

Here again the question was structured as to what sort of thing made the child worry, with a secondary enquiry as to the extent and nature of the anxiety. Results were coded in the following manner:—

1. Normal: worries about real threats only.
2. Moderate: the child at times appears worried for no significant reason.
3. Severe: the child is constantly apprehensive, worrying about real and imagined happenings so that he becomes quite limited in his activity.

TABLE 63

<i>Anxiety</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	41	43
Moderate	...	...	34	33
Severe	...	...	5	4
TOTALS			80	80

The results of this item were consistent with the child's test score of anxiety and his behaviour in the interview, and would thus seem to have reasonable validity.

(79) Disobedience

This is particularly related to the child's behaviour within the home and his attitude to direction from the parents. Items were coded in the following bipolar fashion:—

1. Compliant: a child who is careful to be good, never becoming stubborn, in fact a 'yes' man about the house.

TABLE 64

<i>Disobedience/Compliance</i>		<i>Stutterer</i>	<i>Control</i>
Compliant	...	21	28
Normal	...	39	37
Disobedient	...	20	15
TOTALS		80	80

2. Normal: the child who is fairly easy-going, though on occasions may react with stubbornness.

3. Disobedient: the child who is resistive to suggestions or orders, habitually stubborn, unco-operative or rebellious.

Stutterers appeared rather less compliant and more disobedient than did the control children but the difference was not significant (Table 64).

(80) *Irritability*

This was rated in the following manner:—

1. Normal: the child was equable and placid, although he did react to severe stresses.

2. Moderate: a reactive child with low stress tolerance.

3. Severe: a chronically irritable, fretful, highly strung child who always seemed to be on edge, being upset by many minor happenings.

The results (Table 65) appeared to indicate a trend for stutterers to be more irritable but the difference was non-significant.

TABLE 65

<i>Irritability</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	48	56
Moderate	...	...	27	19
Severe	...	...	5	5
TOTALS			80	80

(81) *Temper tantrums*

These were coded in the following manner after enquiring about frequency and then severity of the episodes:—

1. Normal: bad temper with provocation.

2. Moderate: transient tempers with verbal outbursts.

3. Severe: severe and frequent explosions in which there is loss of control, with violent verbal or physical manifestations of anger.

The results, in Table 66 below, showed no significant differences.

TABLE 66

<i>Temper Tantrums</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	49	53
Moderate	...	...	24	20
Severe	...	...	7	7
TOTALS			80	80

(82) *Jealousy*

This refers to the child's reaction to competition for parental attention either from siblings or the other parent.

1. Normal: nil.
2. Moderate: child is sensitive to any competing relationship but able to tolerate it for defined periods of time.
3. Severe: the child is always sensitive to competition, always being possessive of the parent and hostile to the intruder.

The results again showed no differences.

TABLE 67

<i>Jealousy</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	58	57
Moderate	...	...	20	21
Severe	...	...	2	2
TOTALS			80	80

(83) *Reserve*

This was rated on the following scale:—

1. Normal: a child who is open and frank and able to express his feelings spontaneously.
2. Moderate: a child who is quiet and self-contained, tending to be reserved and considered in his expression of feelings.
3. Severe: little or no show of feelings or affection, the child appearing impassive or even cold.

There were no differences in the distribution of this trait between the two groups.

TABLE 68

<i>Reserve/Spontaneity</i>			<i>Stutterer</i>	<i>Control</i>
Normal	...	...	49	47
Moderate	...	...	25	26
Severe	...	...	6	7
TOTALS			80	80

4. *The Psychometric Testing of the Child*

This section reports the psychological test results for the children. The principal component is the account of the Weschler Intelligence Scale for Children (W.I.S.C.) with all the ramifications of verbal and performance I.Q.s and sub-test profile and scatter. The Benton Visual Retention Test, the Schonell Reading Tests and Tests of Laterality complete the section.

The psychological testing of the children reveals that the experimental group differ significantly from the control group in their intelligence test scores. The mean I.Q. of the stutterers was 7 points lower than the controls. Their failure on the W.I.S.C. does not appear to be a secondary effect due to the severity of their stutter for, firstly, it fails to correlate with severity of stutter, secondly, the verbal sub-tests are not selectively depressed, and thirdly, the mean level of stuttering during testing, being below 5 per cent of words, was unlikely to have depressed the score.

This study confirms the work reported in Chapters 2 and 3 on the association between intellectual handicap and stuttering. This is not to say that all stutterers are unintelligent, for the child with the highest I.Q. in the survey—136—was a stutterer, but rather that stuttering is more common among those of lower intelligence.

The next problem was to explore whether this was a general lack of ability or one with specific features which could be an indication of minimal brain damage.

The Benton Visual Retention Test, the tests of figure drawing and right/left discrimination, the tests of word recognition and silent reading, the estimation of W.I.S.C. sub-test profile and scatter, were all aimed at shedding light upon this point. The results were quite inconclusive. On all tests the trend is in the same direction, for stutterers to do less well than controls, but on only a few does it reach significance and in none is it significant when the correlation with the full scale W.I.S.C. score is partialled out.

It seems that this trend is a reflection of the lack of general ability as revealed by the W.I.S.C., rather than evidence of impairment of special abilities.

We were able to demonstrate no connection between stuttering and handedness or crossed laterality.

(84) *The Weschler Intelligence Scale for Children*

The verbal sub-tests of information, comprehension, arithmetic, similarities and vocabulary, and the performance sub-tests of picture completion, picture arrangement, block design and coding were used in all children for the assessment of intelligence. Results were grouped on a 5-point scale and the findings (Table 69) show that there is a significantly greater number of stuttering children who score below 90. This result is very highly significant at the 0.001 level ($X^2 = 10.1$).

TABLE 69

1. W.I.S.C.		Stutterer	Control
130 and above	...	3	4
110-129	...	15	18
90-109	...	30	45
70-89	...	23	10
69 and below	...	9	3
TOTALS		80	80

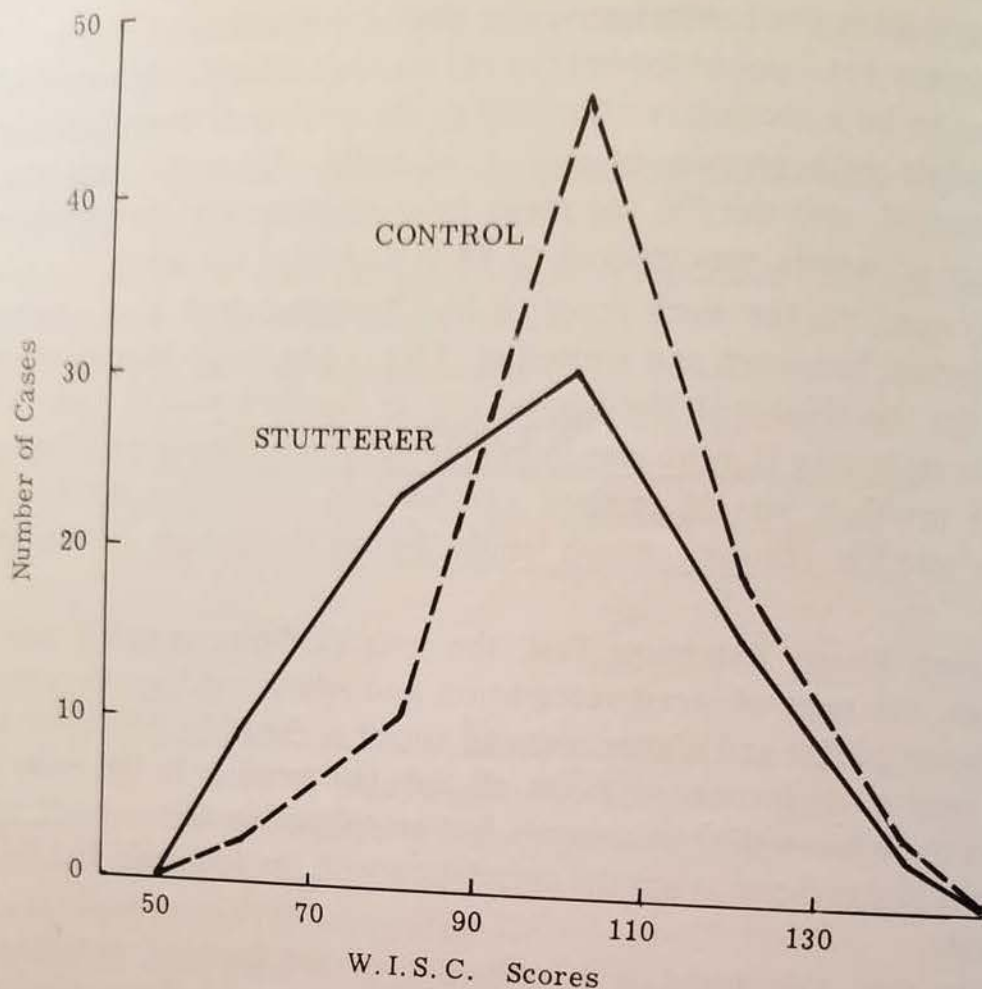


Fig. 10.
Weschler Intelligence Scale for Children: distribution of scores for stutterer and control groups.

Within the total material, the child's low intelligence is seen to correlate significantly with one-parent home, poor family life, inadequate housing, mother's poor school record, mother's poor work record, father's poor personality, mother's low intelligence, with late and poor talking in the child, with errors in figure drawing and right/left discrimination, with modesty, with anti-social behaviour, with disobedience and, of course, with a low reading quotient, a high scatter and with stuttering. Within the stutterers alone, a low social class was seen to correlate very significantly with the child's low I.Q. Obsessional traits in the child correlated negatively with low intelligence.

The result may have been influenced by the fact that the pairs of children came from the same class in a school, and as streaming by ability is a common practice, the revealed difference in I.Q. may be even less than that which really exists.

Five stutterers in the survey came from educationally subnormal schools and it may be contended that these children would distort the findings even though their controls were also taken from the same E.S.N. school. When these children are removed from the groups there is still a significant difference in the distribution of intelligence between the experimental and control children. The expected number of children in E.S.N. schools for 80 truly randomly selected children would not be

TABLE 70

2. Mean Group Scores on Verbal and Performance Scales				Stutterer	Control
Full scale I.Q.	...	...	...	94.7	101.8
Verbal scale I.Q.	...	...	...	95.3	101.4
Performance scale I.Q.	...	...	...	95.0	101.9
3. Verbal Scale Sub-Tests (Scaled Score)					
Information	...	...	...	9.54	10.29
Comprehension	...	...	...	8.31	8.96
Arithmetic	...	...	...	9.54	10.91
Similarities	...	...	...	9.18	10.30
4. Performance Scale Sub-Tests (Scaled Score)					
Picture completion	...	...	...	9.33	10.27
Picture arrangement	...	...	...	8.60	10.27
Block design	...	...	...	9.74	10.22
Coding	...	...	...	9.34	10.33

more than 2, thus to find 5 highlights the frequency of stuttering among those of low intelligence. Actually, the prevalence of stuttering in the E.S.N. children covered by the survey was eight times the expected 1.1 per cent prevalence.

The mean I.Q. of the two groups is significantly different, although not so remarkably as the preponderance of dull children would suggest. The full scale mean I.Q. for stutterers was 94.7, for controls 101.8, a difference of 7.1 points or half a standard deviation. This is significant at the 5 per cent level by 't' test. This distribution may be better appreciated from Fig. 10, which shows that stuttering is more frequent than expected in those of low intelligence, less frequent than expected in those of average intelligence and at about the expected level in those of high intelligence. It is interesting that this state of affairs almost exactly parallels the relationship between social class or mother's I.Q. and the frequency of stuttering.

Although all precautions were taken to ensure that stutterers would not suffer directly because of their verbal disability, it is possible that they did tend to score lower on the verbal sub-tests as a result of their stutter. Therefore it is proper to examine verbal and performance I.Q. results separately. These are presented in Table 70. There is an even depression of the ability of the stutterers to score on the W.I.S.C. scales and the only way in which this could be related to a depression of the verbal scale by their stutter would be if some other factor had selectively depressed their performance score. Their failure on tests of figure drawing and right/left discrimination could be just such a factor.

TABLE 71

<i>Verbal/Performance Difference</i>	<i>Stutterer</i>	<i>Control</i>
1. Verbal I.Q. greater than performance I.Q. by 10 or more points	17	13
2. Verbal I.Q. within ± 9 points of performance I.Q.	48	54
3. Verbal I.Q. less than performance I.Q. by 10 or more points	15	13
TOTALS	80	80

TABLE 72

<i>Standardised Scatter</i>	<i>Stutterer</i>	<i>Control</i>
Scatter less than 2 ...	47	55
Scatter 2 or more ...	33	25
TOTALS	80	80

It is thus necessary to examine the sub-test profiles for the two groups and these are also presented in Table 70. The even patterning and the similarity of the profiles for the two groups make it unlikely that the stutterers have specific ability handicaps. Therefore it is almost certain that the significant difference in intelligence between the two groups is due to a general and diffuse lowering in ability.

Right/left discrimination and figure drawing correlate highly with intelligence in the total material. When intelligence is partialled out, the two special ability tests fail to discriminate between stutterer and non-stutterer. It is therefore suggested that for the bulk of the cases these tests were measuring intelligence rather than specific ability handicap.

Although the group sub-test profiles are similar, inspection of individual scores seems to suggest that there is a degree of scatter about the mean both as between the verbal and performance sub-tests as a whole, and amongst the individual sub-tests themselves. This scatter seemed to be more pronounced in the stutterers than in the controls. Because such a finding, if real, could be suggestive of neurological abnormality, the relation of verbal and performance I.Q.s for each case and the standardised scatters about the mean were calculated and are presented in Tables 71 and 72.

The verbal/performance difference showed an apparent trend for stutterers to have a wider difference when the W.I.S.C. verbal and performance scales were compared, but it was not significant.

Scatter is a measure of the deviation of sub-test scores about the mean score. It was standardised by correcting the mean deviation by the I.Q. There was an apparent tendency for stutterers to show greater scatter on sub-tests but this was also non-significant, Chi squared being 1.5.

We have thus been unable to demonstrate that stutterers differ in any particular way from control children on these tests of intelligence apart from their very significant tendency to score lower. Their low scores do not seem to be related to their speech handicap or to any specific special ability that would be revealed by the W.I.S.C. sub-tests. The conclusion to be drawn from the W.I.S.C. results is perhaps put more appropriately the other way round—that stuttering seems to be more common amongst children of lower intelligence.

(85) *The Benton Visual Retention Test (B.V.R.T.)*

The first 7 stutterer/control pairs seen in the survey were not tested. The results for the remaining 73 pairs, coded in accordance with the manual, are presented in Table 73.

There is a trend for stutterers to do less well on the B.V.R.T., but results fail to reach significance at the 5 per cent level ($X^2=2.5$). The trend is more probably a reflection of the lower intelligence amongst the stutterers than evidence of specific neurological disability.

TABLE 73

<i>Benton Visual Retention Test</i>	<i>Stutterer</i>	<i>Control</i>
Very superior	4	6
Superior and high average	19	19
Average	18	19
Low average and borderline	16	21
Defective	16	8
Not tested	7	7
TOTALS	80	80

(86) *Schonell Reading Tests*

(a) *Word Recognition Test.* Results obtained were expressed as a reading quotient and are presented in Table 74. There is a slight tendency for stutterers to fail on word recognition tests but it fails to reach significant levels. Failure on the Word Recognition Test correlated significantly with almost the same items as low intelligence, both within the total material and within the group of stutterers generally.

(b) *Word Comprehension Test.* This test was used because it required no verbal responses from the child, and the results are presented as reading quotients in Table 75. There is a trend for stutterers to score less than 90 on tests of word comprehension but it fails to reach significance at the .05 level ($X^2=2.6$).

TABLE 74

<i>Word Recognition</i>			<i>Stutterer</i>	<i>Control</i>
<i>Reading Quotient</i>				
110 and over	...	...	17	17
90-109	...	...	22	27
70-89	...	...	24	26
Below 69	...	...	16	10
No score	...	...	1	0
TOTALS			80	80

TABLE 75

<i>Comprehension</i>			<i>Stutterer</i>	<i>Control</i>
<i>Reading Quotient</i>				
110 and over	...	...	21	23
90-109	...	...	24	32
70-89	...	...	18	16
Below 69	...	...	2	2
No score	...	...	15	7
TOTALS			80	80

Thus it would seem that the stutterers tended to have no particular difficulty with tests of reading beyond that which would be expected from the difference in distribution of intelligence between the two groups.

(87) *Laterality*

Handedness was coded as: those who were right-handed for all tests, those who were left-handed for all tests, and those who used either hand. The distribution of handedness was the same for both groups, as is shown in Table 76.

TABLE 76

<i>Handedness</i>			<i>Stutterer</i>	<i>Control</i>
Right-handed	...	...	56	52
Ambidextrous	...	...	21	23
Left-handed	...	...	3	5
TOTALS			80	80

TABLE 77

<i>Crossed Laterality</i>		<i>Stutterer</i>	<i>Control</i>
Unilateral	... ..	36	36
Crossed lateral...	... ..	44	44
TOTALS		80	80

The relationship between handedness and eyedness is shown in Table 77. If the right or left-handed sighted with the ipsilateral eye they were rated as unilateral. If they sighted with the opposite eye, crossed lateral. The ambidextrous people were, of course, classed as crossed lateral. The distribution in the groups was identical.

This data would not support the suggestion that handedness or crossed laterality is related to stuttering. None of the stutterers in the group were sinistrals who had been converted to the right hand for writing.

5. *Electroencephalographic Studies*

This section describes an addendum to the survey which was carried out some six months later than the main body of the work. The survey had appeared to suggest that neurological abnormality could be a factor in some cases. The electroencephalograph was used to explore this possibility with 30 pairs of children. The remaining children in the survey had by this time advanced to secondary schools and so were lost to the investigators.

Method. An Offner type 1 portable 8-channel electroencephalograph was taken to the schools and the E.E.G.s of the children recorded there. Conventional E.E.G. procedure was followed and bipolar recordings obtained, using a range of patterns of the standard 10/20 system (Kiloh and Osselson 1961).

A 15-minute recording was made of each child, and near the end of this time the child was asked to hyper-ventilate for two minutes. No other techniques of activation were used.

The records carried no details of stutterer or control group identity and were randomly presented for interpretation. When all had been read by the E.E.G. consultant they were sorted into their stutterer/control pairs, although the order both within the pair and from pair to pair was still random. The judge was asked to assess which of the two records per pair was more abnormal and to describe why.

Summary of Results. There were no differences in the distribution of abnormal E.E.G. recordings, either on routine interpretation or when judgment was made by rating one of the pair as more abnormal than the other.

Summary of Intergroup Comparisons

The experimental and control groups were compared on 81 separate items. In 9 of these items the intergroup differences achieved significant levels. The families from which the two groups of children came had similar characteristics in regard to ages of parents and number and distribution of children within the families. It was difficult to assess social class because of the partial matching implicit in the selection of controls.

The 4 items which deal with qualitative aspects of the child's home environment indicate that more stuttering than control children have been socially deprived. More have been deprived of a home in which there are both parents and so have had to cope with the upheaval and change of role which is implicit in a one-parent home. More have been deprived of a satisfactory home atmosphere in which parents and children can unite as a stable, ongoing, productive family. More have been deprived of adequate housing, so that with these other factors have gone conditions of over-crowding. More have been deprived of healthy relationships with grandparents, aunts and uncles, with all the opportunity for sorting out developing emotional problems that a sympathetic circle of relatives affords.

Mothers of stutterers gave very similar personal histories to control mothers. They have, however, had significantly poorer school records and significantly poorer work histories. Consistent with this is the finding that more mothers of stutterers appear to be of below average intelligence than do the control mothers.

The two groups of mothers are strikingly similar in regard to psychiatric history and current level of neuroticism. It seems likely that the unsatisfactory home environment is not so much a function of neuroticism in the mother, as of her lower intelligence and poorer capacity to cope, as expressed by her poor school and work record.

Biologically the two groups of children seem to be comparable, having had similar developmental histories and achieving similar physical parameters. The stutterers did seem to show a higher incidence of adverse perinatal circumstances. This, too, could be a function of the mother's intelligence and social disorganisation, for it has been shown that these items correlate with the standard of obstetric care obtained by a parent.

When the speech of the children is explored it is found that stutterers are significantly late in talking, and, when they do talk, they have a much higher incidence of developmental disorders of articulation. A positive family history of stuttering, which was so common amongst the experimental children, was practically absent in the control families. Thus it would appear that the stutterers not only suffer from adverse social circumstances but also have some specific language disability, part of which will be related to the adverse environment and part perhaps to a specific genetic factor.

The psychiatric assessment of the children failed to establish differences between the two groups. At interview, the stuttering children described themselves as being, and behaved as if they were, exactly comparable with the control children. In the history of the child's adjustment which was obtained from the mother, the stutterers appeared to be no more, and no less disturbed than the control children. These findings are consistent with the earlier failure to establish that the mothers of stutterers were more neurotic than the mothers of control children.

Psychological testing of the child showed that the stutterers as a group did less well on the W.I.S.C. Attempts to establish whether the children had specific disabilities which would be consistent with a diagnosis of minimal brain damage did not produce a positive result. Thus it appears that there is a higher incidence of

stuttering amongst children of below average intelligence. A child's intelligence would appear to be a function of the interaction of the genetic endowment which he obtains from his parents and the environment in which he is raised. In the case of the stuttering children both these factors have been shown to be deficient. It thus seems unnecessary to postulate that the child has sustained more specific neurological damage, although the predisposition to stutter, if genetically transmitted, may be a very specific neurological handicap.

Statistical Analysis of the 160 Cases

The raw scores of the intergroup comparisons which have just been presented are the basic material of the investigation. Simple comparisons are limited in their scope and it is more enlightening to use statistical methods, where applicable, to discriminate more complex and less obvious intergroup differences.

Multiple regression and factor analysis of the data was carried out using a Ferranti Pegasus computer. On the programmes used this machine was limited to 37 items including the criterion, and thus some selection of the 81 items had to be made. The items used were those which had given a significant difference on intergroup comparison, with, in addition, items selected as clinically important. They are listed in Table 78.

To avoid marked differences in range between items, all items were coded either absent or present, or absent, mildly present and markedly present. The rating scales used for coding the items are presented in the previous section and were designed with this further statistical limitation in mind. Items such as social class or intelligence which there were rated on 5-point scales had to be further reduced to 3-point scales to comply with the limitations of the programme. The 37 items and the direction of scoring on the 3-point scales will be found in the appendix.

Multiple Regression Analysis of the Total 160 Subjects—

80 Subjects and 80 Controls

The data on the 37 items relating to the 160 cases was submitted to a multiple regression analysis using stuttering/non-stuttering as a criterion. If the criterion is a dichotomy, as in this case, multiple regression is formally equivalent to Discriminant Function Analysis (Fisher 1941).

Results of the analysis of the total group may be seen in the accompanying table. This shows the correlations with the criterion of stuttering and the regression weight of each item.

These 36 items discriminate significantly between the experimental and control groups ($F=2.96$, $df=36$ and 122). Thus, apart from stuttering, the experimental group was significantly different from the control group. A full correlation matrix for this analysis may be found in the appendix.

In order to analyse the differences between the stutterer and control groups further, the items were arbitrarily sub-divided into four groups. The groups were constructed on clinical grounds to relate to four areas of the material, which, it was hoped, would have some relationship to theories of aetiology or development of stuttering. The four groups were as follows:—

TABLE 78

Multiple Regression Analysis of 160 subjects

Item	Correlation with Stuttering	Regression Weight*
A. Sex ... ..	.000**	-.86
B. One-parent home ... ..	.180	.26
C. Family life ... ..	.113	.42
D. Housing ... ..	.146	.21
E. Extended family group ... ..	.135	.37
F. Maternal grandparents ... ..	.042	.09
G. School record ... ..	.165	.46
H. Work record ... ..	.173	.49
I. Husband's personality ... ..	.068	-.39
J. Neuroticism ... ..	.033	-.41
K. Intelligence ... ..	.112	-.38
L. Family history of stutter ... ..	.404	1.53
M. Birth circumstances ... ..	.177	.19
N. Sibling rank	-.083	.06
O. Late talking ... ..	.299	.80
P. Poor talking ... ..	.341	1.42
Q. G.A.S.C. anxiety score ... ..	.052	-.05
R. Figure drawing ... ..	.154	-.64
S. Right/left discrimination ... ..	.140	-.01
T. School attitude ... ..	.168	.46
U. Peer relationships	-.110	-1.26
V. Enuresis ... ..	.096	.94
W. Modesty ... ..	.132	.38
X. Over-activity ... ..	.086	.13
Y. Anti-social behaviour ... ..	.060	-1.01
Z. Obsessional traits	-.049	.38
A2. Aggression ... ..	.068	.21
B2. Dependence ... ..	.101	.34
C2. Timidity ... ..	.044	.88
D2. Disobedience ... ..	.118	.39
E2. Irritability ... ..	.082	-.16
F2. Temper tantrums ... ..	.048	-.01
G2. W.I.S.C. ... ..	.197	.96
H2. Word recognition test ... ..	.048	-.78
I2. Verbal/performance difference ... ..	.031	.35
K2. Scatter ... ..	.091	.36

*Regression weights are those numbers which, when used to weight the features, give the maximum prediction of the criterion, in this case stuttering.

**This figure is necessarily 0 because of matching procedure.

1. Neuroticism in the child:

G.A.S.C. Anxiety Score, school attitude, peer relationships, enuresis, modesty, over-activity, anti-social behaviour, obsessional traits, aggression, dependence, timidity, disobedience, irritability, temper tantrums.

2. Items relating to the home and mother:

One-parent home, family life, housing, extended family group, school record, maternal grandparents, work record, husband's personality, neuroticism, mother's intelligence.

3. Items related to the child's neurological speech competence:

Birth circumstances, sibling rank, late talking, poor talking, figure drawing, right/left discrimination, over-activity, anti-social behaviour, scatter.

4. Items related to the child's intellectual ability:

Weschler Intelligence Scale for Children, work recognition test, verbal/performance difference, scatter.

Only in the third group of these items, which related to the child's competence in language development, did the features discriminate significantly between the control and experimental groups ($F=3.65$, $df=9$ and 150). This does not mean necessarily that the other groupings failed to discriminate, but merely indicates that the results were non-significant in the statistical sense. But it does suggest that, within this material, one of the major ways in which stutterers differed from controls, apart from their stutter, was in their development of speech, and that this was sufficient to discriminate between the two groups.

It is desirable to know how well these 36 features discriminate between the stutterers and non-stutterers in the total material. This is indicated by the multiple correlation coefficient, which in this case was 0.69 for the 36 features. Although this shows the extent of the predicted variance in the material, it is of more clinical interest to look at a smaller group of items. The multiple correlation coefficient for the 3 most significant items in the material was 0.50. These items were family history of stuttering, late talking and poor talking. Because of their possible clinical importance it was necessary to discover how efficiently they discriminated stutterer from control in individual cases, and so each subject's score on these three items was calculated. The score equalled the sum of the products of the regression coefficient times the raw score for each of the three items. The stutterers naturally tended to score high and the controls low, and when the score 6.0 was chosen as the cut-off point these 3 items differentiated 49 (61 per cent) of the stutterers from 71 (88 per cent) of the controls. This relationship may be more clear from Fig. 11.

This finding has considerable practical importance. It may well be that when very young children are brought to a clinic because of speech difficulties it will be possible to predict those that are likely to be at risk of stuttering in the future. According to this finding, it would seem that a child with a family history of stuttering and evidence of late or poor talking has about five times more chance of developing a stutter than has a child without these disabilities.

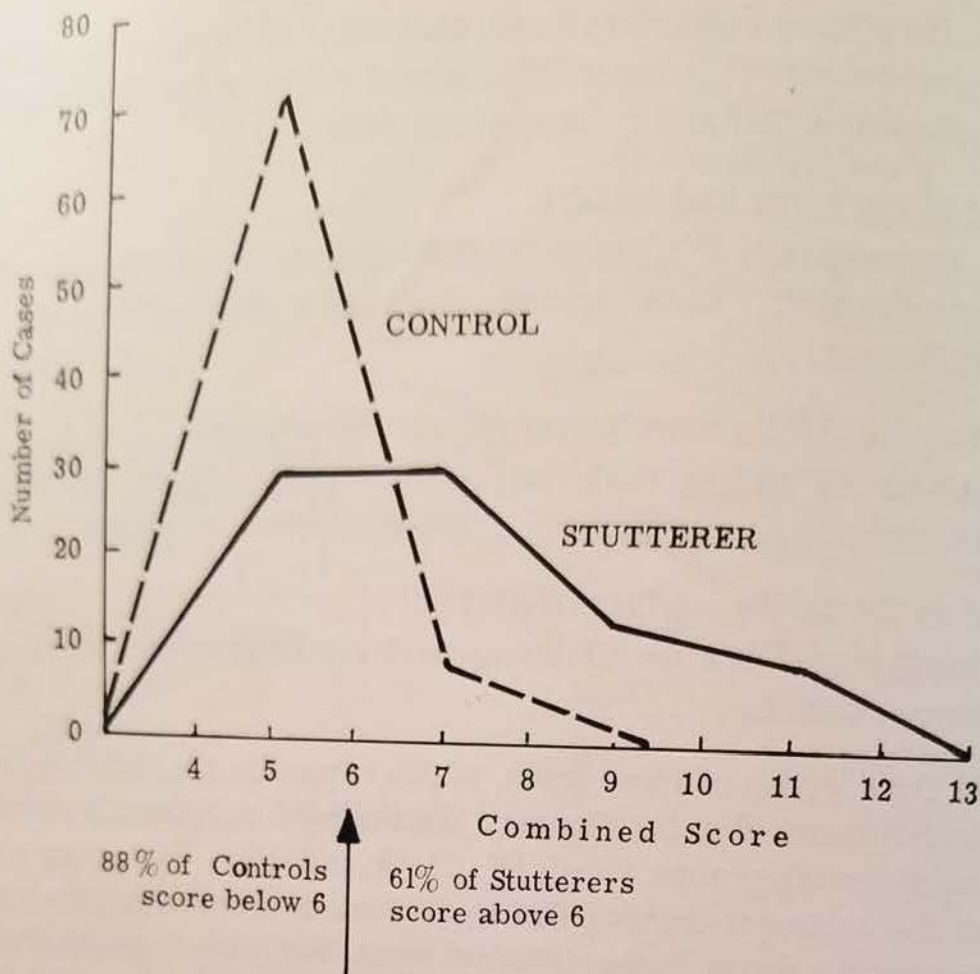


Fig. 11. The combined score on 3 items—Family history of stuttering, Late talking, Poor talking—correctly identified 120 of the 160 children.

Factor Analysis of the Total Material

A Principal Component Factor Analysis was carried out on the computer with these 36 features, excluding the 37th feature, the criterion, stuttering. The complete table of factor loadings for each of the first four factors on each item is in the appendix. These four factors are all significant.

Factor A loadings correlated 0.52 with the correlation between each item and stuttering. Factor B correlated -0.28 with stuttering. These two factors were rotated through 28° to maximise the correlation of Factor A with stuttering. In this situation the rotated Factor A (Factor A¹) correlated 0.59 and the rotated Factor B (Factor B¹) correlated -0.05 with stuttering. Factors C and D unrotated correlated -0.07 and $+0.08$ with stuttering. These correlations were obtained by calculating the correlation between the factor loading on the one hand and the correlations of the item with stuttering on the other.

Factor A¹ (Fig. 12), which correlated highly with stuttering, comprised 15 items concerning both mother and child with loadings of .3 and above.

There were 9 items concerning the child. Four items—intelligence, reading, right/left discrimination and figure drawing—are all intercorrelated measures and represent mild intellectual impairment. Late and poor talking are indicative of a

Factor A rotated 28° (Factor A¹) contributes 11.9 per cent of the total variance. Correlation with stuttering + 0.59.

FACTOR A¹

<i>Factor Loading</i>	<i>Items concerning the child</i>	<i>Items concerning the mother and home</i>
800	Low W.I.S.C. score	
780		
760		
740		
720		
700		
680		
660	Low reading quotient	
640		
620		
600	Right/left disorientation	Mother's low intelligence
580	Figure drawing failure	
560		
540		
520		Mother's poor school record
500		
480		
460	Late talking	
440		
420		
400	Disobedience	
380	Low obsessionality	Poor family life
360	Anti-social behaviour	Mother's poor work record
340	Poor talking	
320		One-parent home
300		Husband's personality

Fig. 12. Factor Analysis of the Total 160 Cases.

specific speech disability. Disobedience, anti-social behaviour and an absence of obsessional traits are a group of behaviour disorders which relate to culture and low intelligence as much as they do to emotional disorders in the child.

For the home and mother, the six items, low intelligence, poor school and work record, a high incidence of broken homes, unsatisfactory husbands, and poor family life, paint a picture of a mother of low ability who generally fails to cope as a person, as a wife or as a mother.

In short, Factor A¹ is concerned with the child's poor ability to think, talk or behave and the mother's inability to cope.

Factor B¹, which appeared, along with Factors C and D, to be equally distributed amongst stutterers and controls, was composed of items suggestive of neuroticism in the mother and the child.

Factor C is similar to Eysenck's Introversion/Extraversion Factor, and Factor D would seem to be another aspect of neuroticism in mother and child. None of these factors, B¹, C and D, are correlated with stuttering, and their appearance must be considered as a result of the quantity of psychiatric information which was used for this analysis and as being indicative of the normal variation of such data that occurs within the community.

It is interesting to note that there is considerable overlap between the items of sub-group 3 (see p. 105), which were selected for the multiple regression analysis to indicate neurological speech competence, and the items appearing on Factor A¹. Omitted from Group 3 and very significant on Factor A¹ are the formal items of ability, intelligence and reading. The correlation between the more formal tests of intelligence and figure drawing and right/left discrimination is extremely high, and these items may best be regarded in this material as tests of general ability rather than as measures of specific neurological disability. Items related to the mother and the home have high loadings on Factor A¹ and this suggests that genetic and cultural factors are likely to be a more significant explanation for the low intelligence than is specific neurological abnormality.

Conclusions

Johnson (1956) has said that if one didn't hear a stutter one could never identify a stutterer. This is undoubtedly true of the individual, for practically none of the differences described in this study possess any specificity. The discussion of the differences between the groups of stutterers and non-stutterers presented in this chapter has highlighted the fundamental idea that lies behind Johnson's statement—that for most items stutterers are no different from non-stutterers.

One cannot, however, extend this argument to say that, apart from their stutter, stutterers are the same as other people in all other respects. What then are the differences between the two groups, and, more importantly, what is their significance?

In this study a number of important differences did emerge on simple inter-group comparison. To recapitulate briefly, the stutterers were characterised by a degree of social deprivation in the home, by their mother's poor ability to manage, by a positive family history of stuttering, by their own history of late and poor talking, and by their poor attainment on tests of intellectual ability. This picture of the

way that the two groups differ was reinforced by the factor analysis, in which the first factor (compounded of the child's poor ability to think, talk and behave and the mother's inability to cope generally), correlated 0.59 with stuttering.

Given the total information, an individual could be identified as a stutterer or a control with some degree of reliability. When using only 3 items (family history, late talking, poor talking) it was possible to identify correctly 120 of the 160 children. Thus stutterers, apart from their stutter, do differ from non-stutterers in simple and obvious ways. This information is evident in early childhood and may be of considerable help in assessing the prognosis of the speech disorder.

As a group, then, the stutterers showed a 'lack of capacity' when compared with the controls. Perhaps this expresses one set of conditions which predispose towards stuttering. This set of conditions may handicap the child's attainment of fluent speech long enough to make him run an increased risk of becoming a stutterer. It is not likely that this is the only set of conditions which increases the risk of stuttering, for a number of children of undoubted high ability who clearly have no 'lack of capacity' have become stutterers. In these children, despite the protection offered by high intelligence, some other factor has apparently provoked the stutter. It is therefore essential to look closely at the group of stutterers themselves, in an attempt to discover whether they represent a single homogeneous group or the final common pathway of a number of aetiological factors. This is what the next chapter attempts to do.

Survey of Stuttering in Schoolchildren

The Stutterers

The Stutter

This section contains information about the stutter, its severity, nature, the age of onset and clinical course. The information was obtained in part from the assessment of the child's speech at the school and at the clinic and in part from the mother's remembered history of events.

The average child stuttered on 10 per cent of the words at his worst and on about 5 per cent of his words when relaxed and settled within the clinic. At 10 years repetitions were still present in three-quarters of the children, prolongations and blocks were less common and the associated body movements were present in only 7 per cent of the children. Repetitions were the first reported symptoms in more than 90 per cent of children, the other symptoms usually following later. This data strongly supports Bloodstein's concept that stuttering pursues a formal course of development. The association between the duration of the disorder and the severity of the symptoms is also consistent with his ideas.

The group of 80 9- to 11-year-old children, many of whom must be regarded as persistent stutterers, had a distribution of age of onset similar to the persistent and benign groups in Chapter 3. Half stuttered before their 5th birthday and 95 per cent before their 8th birthday, and from the shape of the cumulative onset curve it would seem that very few others would become stutterers after the age of 11. These children were, in the main, unconcerned about their disorder, regarding it as a nuisance but not a calamity. Many admitted that speaking aloud in class was not easy, but few were consciously aware of other specific situations which should be avoided. This feature might be expected to develop during the next few years as some become Phase 3 and 4 stutterers.

Nearly 40 per cent of the children had received treatment for the disorder and it seemed that they had been chosen on the basis of the severity of their stutter. Most had been selected for treatment by the school medical service and thus the mother's intelligence, anxiety and social class did not have the usual selecting effect.

Delayed development of speech, and faulty articulation when speech did develop, were noted in Chapter 5 to be more frequent among the stutterers than the controls. These two items, 'late and poor talking', to use Ingram's (1963) apt phrase, are often considered to be related to the same aetiological factors. It is instructive to look at their significant correlations to see if this is so with the stutterers.

Late talking correlated significantly with poor home atmosphere, mother's poor work record, repetitions, poor talking, little fluent speech prior to stuttering and low intelligence. This is the pattern that might be expected, and it is interesting that in children who were late talkers the stutter often retains its simple repetitive nature.

Late talking would appear to be distributed in an essentially normal fashion throughout the group, and those classified as late talkers were not significantly different from those who were not so regarded when late talking was used as the criterion for a multiple regression analysis.

Poor talking on the other hand differentiated two groups of stutterers in a highly significant fashion ($F=2.5$, * $df=79$ and 36). It correlated significantly with a rather different group of items: severe stuttering, blocks, late talk, little fluent speech prior to stuttering, prior treatment, anti-social behaviour, and failure on tests of reading, figure drawing and right/left discrimination. Poor talking in stutterers is related to two quite different groups of items from late talking. The first group of items describes severe stuttering, the converse to the situation with late talking. The second group includes the special-ability items which, until now, appeared to be mainly measures of intelligence, although in this context they do suggest a rather generalised apraxia in some stutterers—an apraxia with primary effects on articulation and figure drawing, and more remote effects on reading and spatial discrimination.

This material is not sufficiently large to advance this argument further, apart from concluding that, in stutterers, late and poor talking do not appear to be two aspects of a single developmental disorder of speech.

1. *Severity of Stutter*

The severity of the stutter was recorded at school and at the clinic interviews. From these records two estimates were made: firstly, the severest grade heard, and, secondly, the usual level in free conversation.

The severity was assessed in terms of the 3-point grading scale. Although this is related to the percentage of words stuttered, as estimated from the tape recordings that were made, most of the ratings at school or clinic were clinical judgments of severity. These had been shown to correlate highly with the ratings made from an analysis of tape recordings.

The severity of the stutter both at its worst and at its more usual level is displayed in Table 79. The second estimation, 'usual level of stuttering', was used for the division into mild and severe stutterers for the statistical analysis. The importance of this information on severity is that although at their worst the children had a mean stutter of about 10 per cent of words, during the clinic sessions the severity declined to about 6 per cent. Almost all the stutterers improved sufficiently to be included in the next less severe group, many of the severe becoming moderate, the moderate/mild and the mild hardly stuttering at all.

TABLE 79

<i>Severity of Stutter</i>	<i>Severest Level</i>	<i>Usual Level</i>
Grade 1: mild ...	37	56
Grade 2: moderate ...	26	18
Grade 3: severe ...	17	6
TOTALS	80	80

*The 'F' ratio indicates the extent to which differences between the groups are statistically significant.

On initial contact only 46 per cent of the children were regarded as mild stutterers, but, by the end of the interview, 70 per cent had improved enough to be classed as mild stutterers and so were able to communicate reasonably well without the stutter becoming a handicap. Severity of stutter correlated significantly with the following items: prolongations, blocks, poor talking, little intelligible speech before stuttering, and prior treatment.

2. *The Symptoms*

The symptoms of stuttering were analysed under four headings: repetitions, prolongations, blocks, and associated symptoms. Their incidence at onset as reported by the mother, and their present frequency as noted in the interview, are displayed in Table 80. Repetition of sound and syllable is by far the most commonly remembered initial symptom, other more complex symptoms being quite rare. As the disorder develops these more complex symptoms become more prominent, and the repetitions remain the sole symptom in only the mild cases.

TABLE 80

<i>Symptoms of Stuttering</i>	<i>Per Cent Showing Symptom</i>	
	<i>At Onset</i>	<i>When Surveyed</i>
Repetitions	92%	74%
Prolongations	4%	33%
Blocks	4%	33%
Associated symptoms	0%	7%

Prolongations and blocks would appear to be different aspects of the same phenomenon occurring on different sounds. Of the one-third of the children who demonstrated prolongations, most also showed blockings. This highlights an obvious feature of the syndrome, that as the disorder develops new symptoms are added but the old ones are not necessarily discarded.

From the correlation matrix (see appendix), repetitions were significantly associated with poor family life, the absence of blocks and late talking. Prolongations correlated with severe stuttering and blocks. Blockings were significantly correlated with severe stuttering, prolongations, early onset of stutter and poor talking.

When the children were asked which situation they found particularly difficult for speech, the results fell simply into two categories. Twenty per cent of the children felt that speaking to their parents at home was the most difficult situation, and 80 per cent considered that speaking at school to the teacher was their most difficult situation. In this age group there was a surprising lack of identification of other difficult situations. This is exactly what was noted by Bloodstein, for situation-avoidance patterns are not a feature of many stutterers in this age group. In fact anxiety and embarrassment about the disorder are still mercifully absent, and most consider their stutter as just a nuisance.

3. Age of Onset

When plotted cumulatively, the age of onset had the shape of a negatively-accelerated growth curve. In this group of 80 children a few were reported to have begun stuttering at the age of 2, a quarter had begun by their fourth birthday, half by their fifth birthday and nearly three-quarters by their sixth birthday. Only 5 per cent began after the age of 7. It seems that very few will begin to stutter after the age covered by the survey.

The longitudinal study of stutterers reported in Chapter 3 revealed a similar pattern of onset. The mode of onset figures can be grouped, and Table 82 sets out the total percentage of the mild and severe stutterers whose mode of onset occurs in each group.

TABLE 81

<i>Age of Onset</i>	<i>No. of Children</i>	<i>Cumulative %</i>
2	6	8%
3	13	24%
4	21	50%
5	15	70%
6	11	82%
7	10	95%
8	3	99%
9	1	100%

TABLE 82

<i>Mode of Onset</i>	<i>Mild Stutterers</i>	<i>Moderate and Severe Stutterers</i>
	N = 56	N = 24
1. Stutter begins with onset of speech	9%	33%
2. Some fluent speech—stutter begins in pre-school period ...	34%	37%
3. Speech well established—stutter begins in infant school period	36%	21%
4. Long period of fluent speech—stutter begins in junior school period	20%	8%

The severe stutterers (at the age of 10 years) seem to have had an earlier onset, so that there appears to be a relation between age of onset, duration of stuttering and severity. Nevertheless, some who began early still remain mild stutterers. Of the 14 children who had begun to stutter within the past four years, only two were in the moderate or severe grade. This is consistent with the 1,000-Family study reported in Chapter 3, for there the benign stutterers with a late age of onset, who presumably had only mild stutters, remitted before the age of 15.

In this present study the girls had a later mean age of onset, but because their mean period of stuttering is shorter some would already have remitted and would have been missed in the survey. It was interesting that the girls tended to be milder stutterers than the boys. This is perhaps a function of the recent onset of their stutter.

In Newcastle the Education Committee runs a speech therapy service, in addition to the usual hospital clinics. It is surprising, therefore, to find that 62 per cent of the children, granted that many of them were mild stutterers, had received no treatment at all. Previous speech therapy was noted to correlate significantly with males, with severe stuttering, with poor talking, with an early onset of stuttering and with little intelligible speech. In this material then it was a correlate of the severity of the disorder alone, a most desirable state of affairs.

Statistical Analysis of the Data

1. *Multiple Regression Analysis*

Within any group it is desirable to know if simple criteria will differentiate sub-groups. Within this material three questions were asked. Do any of the measured characteristics differentiate (a) the boys from the girls, (b) the severe stutterers from the mild, and (c) those with a family history of stuttering from those without one? This section reports those enquiries. The items used for these are listed in the appendix.

(i) *Sex*. When sex was used as the criterion, the girls were found to be significantly different from the boys when the features of sub-group 3 ('neurological speech competence') were used ($F=2.16$, $df=9$ and 70). A similar calculation with the control subjects using sex as the criterion revealed no difference between the two sexes. The girls were heavily endowed with the other distinguishing characteristics of stuttering, especially those related to speech and intellect. The girls had a more frequent positive family history and thus it seemed that they needed a greater pre-disposition to become stutterers.

(ii) *Severity of stutter*. When severe and mild stuttering was used as the criterion the remaining 36 features failed to discriminate between the two groups (F ratio less than 1). Nor did any of the items in the four sub-groups (see Chapter 5, p. 105) discriminate significantly between the mild and severe stutterers (F ratio in all cases being less than 1). The finding that mild stutterers did not appear to differ from severe stutterers in respects other than the stutter was unexpected, because one expects pressure of aetiological factors to parallel the severity of the symptom. The finding is thus very interesting. The 80 controls and 56 mild stutterers were examined using stuttering as the criterion, and in this case the results closely paralleled the findings when the total group of stutterers was used, (F ratio being 3.33 significant);

this was so also when sub-group 3 was examined (F ratio 3.0 significant). Next the 80 control children and the 24 severe stutterers were compared, using stuttering as the criterion. They gave a similar result to the previous analysis, although this time the significant difference was confined to sub-group 3 (F being 3.06). This was a function not of any difference between mild and severe stutterers in regard to these features, but rather of the small number involved in this last analysis.

(iii) *Family history of stuttering.* A family history of stuttering was the feature with the highest correlation with stutter, and yet this term was not prominent in any of the factors in the total group factor analysis. Furthermore, because of its apparent independence of other features it was not included in any of the sub-groups used for prior analysis in Chapter 5. It was important therefore to do a further multiple regression analysis using family history as the criterion. The remaining features, both the 35 excluding severity of stutter and the 36 including it, failed to discriminate between the group with family history and the group without (F ratio in each case was 1.3 and was thus not significant). Thus it may be said that the presence or absence of a family history of stuttering does not seem to be significantly related to any of the other features measured.

2. *Factor Analysis of 80 Stutterers*

A number of new items was selected to refer to stuttering. Because of the computer's limitation to 37 features, further analysis of the experimental group meant that a fresh data tape had to be punched, which replaced some of the features with others more directly related to the stutter.

The items are fully listed and defined in the appendix, but items included in the previous computer analysis of the total groups are listed here:—

Social class and social mobility.

Mother's obsessionality and contentment.

Perinatal circumstances.

Repetitions, prolongations and blocks.

Age of onset of stutter, years of fluent speech prior to onset, and prior treatment.

Anxiety at interview, interpersonal relationships, and school attitude.

This new grouping of items was much more concerned with the stutter phenomenon itself. All these items were scored in a similar way to the previous group with the higher numbers expressing abnormality and the lower numbers normality. Late onset of stutter and years of fluent speech were scored in the opposite direction, for in these a low score is pathological.

The complete correlation matrix for these features may be found in the appendix. A principal component factor analysis was performed on this matrix. A table of factor loadings for each item for the first three significant factors is also given in the appendix, while features with a high loading on each of the three significant factors are displayed in Figs. 13, 14 and 15.

The factor score for each individual was calculated in turn for each factor. It is the sum of the products of the factor loading, times the raw score divided by the standard deviation for each feature. It was used to identify individuals scoring high

Factor I 12.2% of total variance.

FACTOR I

Factor Loading	Items relating to mother	Items relating to child
800		
780		Low W.I.S.C. score
760		
740		
720		R/L disorientation.
700		Low reading quotient.
680		Figure drawing errors.
660		
640		
620		
600	M's low intelligence.	
580	M's poor work record.	
560	Poor family life.	
540		
520		
500		
480		
460	Low social class.	
440		
420		Disobedience.
400	M's discontentment.	Late talking.
380	M's neuroticism.	
360		
340		Anti-social behaviour.
320		Poor talking.
300	One-parent home.	Late onset of stutter.

Figure 13. Factor Analysis of 80 Stutterers.

on a particular factor, not because they would constitute a separate group, but for purposes of illustrating the meaning of the factors. It is to be remembered that all factors are orthogonal; in other words, a high loading on one does not prejudice in any way the same individual's score on the other factors. The three significant factors will now be described in turn.

FACTOR I

This factor resembles Factor A¹, derived from the total material, which illustrated ways in which the group of stutterers differed from the control group.

Factor I is also composed of items illustrative of the child's poor ability on tests of intellectual functioning, of his retarded and abnormal speech development and of his failure to learn to conform with society. The items concerning the mother and home show similar evidence of a failure to cope with school and work, but, more importantly, they show failure in the creation of a stable home and marriage as a satisfactory environment for the child.

The resemblance to the first factor of the total material is rather more striking when it is realised that the factor loadings obtained in this analysis are proportional to the discriminating power of each feature in distinguishing stutterers from non-stutterers. Severity of stuttering and most of the other indicators of the complexity of the symptoms of the disorder correlate at or near zero with this factor. Thus it seems to be completely independent of the natural history of the disorder, and yet may well be intimately concerned with whether one becomes a stutterer or not.

This may indicate that a general 'lack of capacity to think, talk and behave', may be an important element in the initial development of stuttering, although, once begun, its development may depend more on other items. This 'lack of capacity' is not confined in a particular way to certain stutterers, for the scores for individual subjects on this factor showed a continuous and normal distribution.

The meaning of this factor may be made clearer from the accompanying case history. This child scored at the 90th percentile on Factor I and below the 25th percentile on Factors II and III. In this respect he is unlike the majority of stutterers, but he serves to illustrate the general 'lack of capacity' inherent in Factor I.

Case 253 (C.A. 11y. 1m).*

The first thing one noticed about this small and well-brushed boy was his constant smile, which became a nervous laugh when he was spoken to. His manner was a mixture of compliance and aggression, but he was co-operative on interview and during testing.

The child had an uneventful early development but was late in starting to talk. He did not use phrases until three years old and at 10 years still had some faulty articulation. His stutter, which was mild, consisted of rather rapid repetitions. It had started when he first went to school and had never been more than a slight handicap.

He had several friends both in and out of school, and was fond of his mother but resentful of his father. This difficult relationship became apparent both on interview and during the Raven's Controlled Projection Test, when he told a story of violence of father to child. He was a capable

*C.A.—Chronological Age.

lad in practical matters about the home, but excessively modest—never letting his parents see him undressed. Two years before he was in trouble with the police for larceny and destructiveness and was still on probation. He also played truant from school fairly regularly.

On psychometric testing he had a full scale I.Q. of 83, a verbal scale of 86, and a performance scale of 83. His reading age was only 7 years 6 months.

He lived in a poor, ill-kept home with his mother, father and four other children. He was the second youngest child. No-one else in the family stuttered. The house itself, though structurally adequate, was in no sense a home. There was no joint family activity and the mother's only reason for being pleased with the area was that 'the neighbours leave us to ourselves'.

The mother was an obese, unwashed woman who told of being deserted by her own mother in infancy and being brought up by her father and a housekeeper, and sent to work in service at an early age. She had no contact with friends or relatives and her relationship with her husband had been unsatisfactory since he fell ill with tuberculosis 13 years previously. This disease was no longer clinically active, but the husband had never worked since then and spent his time at home, without interests, irritable and moody.

Apart from her casual, slovenly, remote attitude to her family and its care, the most striking feature of the mother's personality was her aloof and almost paranoid attitude to friends and neighbours. She was emotionally unresponsive and quite incapable of maintaining interpersonal relationships. It was considered that she was below average intelligence and, in addition, showed some schizoid personality traits.

Coming from such a background the boy, who was dull, made surprisingly good contacts with his peers, and his anti-social behaviour, though in part motivated by anxiety, was also an expression of cultural influences.

The next child scored above the 90th percentile on Factors I and II and below the 25th percentile on Factor III. He was a severe stutterer and illustrates how features of orthogonally related factors inter-relate in the one child.

Case 152 (C.A. 10y. 3m.)

This undersized, shrinking, strange-looking little boy was difficult to interview, and was equally reluctant to speak at home, at school and in the clinic. It took some time to win his confidence but eventually he relaxed and was able to give a fair account of himself and his activities.

After a normal birth this child failed to thrive, and every stage of his development was fraught with difficulties. He was unable to suck and spent a few weeks in hospital on supplementary feeding at a very early age, and was three years old before he could cope with solid food. He was slow in passing all his milestones, sitting up at 14 months and walking at about three years of age. Control of bowel and bladder was delayed and he still wet his bed.

He was over three-and-a-half years old before he spoke at all and speech was unintelligible until he was nearly six. As his speech became clearer

his stutter became more apparent, beginning at the age of five-and-a-half years, so that at the interview it was a severe handicap to communication. The stutter appeared to be in the fourth phase, demonstrating repetitions, blocks, prolongations and the most complicated facial grimaces. At times he appeared to hold his breath, releasing it with a short cough. This coughing type of stutter may be linked with his history of frequent bouts of respiratory infection. He seldom spoke spontaneously and deliberately withdrew from speaking situations.

His mother described the child as being excessively dependent and babyish, making constant demands on her attention, and reluctant to go out to play or indeed to carry out any independent action. Any pressure or stress resulted in irritability and temper tantrums, and in bouts of diarrhoea. He appeared to be fond of his mother and behaved more normally with her than with anyone else.

The explanation for much of this lad's disability became obvious on psychometric testing, which revealed a full scale I.Q. of 75, a verbal scale I.Q. of 76 and a performance scale I.Q. of 79, with a reading age of five years 6 months.

The boy lived with his mother and elder brother in a clean, overcrowded small house which was always festooned with half-dry washing when visited. The mother was only just able to cope with the family and the daily washing necessitated by regular bed wetting was proving to be almost too much for her.

She came from a working-class home which, at the age of 13, after her mother died, she ran herself and raised her younger sister there. She did moderately well at school, but, because of her responsibilities, had to leave early and subsequently made no friends and had a dreary adolescence. She continued to work in the home until she married. At the age of 22 she met her first boy friend, a casual and rather inadequate psychopathic labourer, and married him against the wishes of her father. Their marriage was fairly satisfactory until the children arrived, when the husband was quite unable to accept the additional responsibility and became still less adequate as a provider. She left him and returned to her own father, taking the two children with her.

She now lived on a small allowance supplemented by part-time work in a shop. She made a few friends among the neighbours and still visited her sister regularly, but running the home and looking after the boys occupied most of her time. She was anxious, high-principled, very conscientious, and at one time was quite disabled by compulsive checking rituals in the house.

This case presents a picture of a dull child from an inadequate and broken home who was handicapped by his severe stutter, his poor health, and his low intelligence. His emotional development would appear to be consistent with his present stage of general development rather than indicative of emotional disorder.

FACTOR II

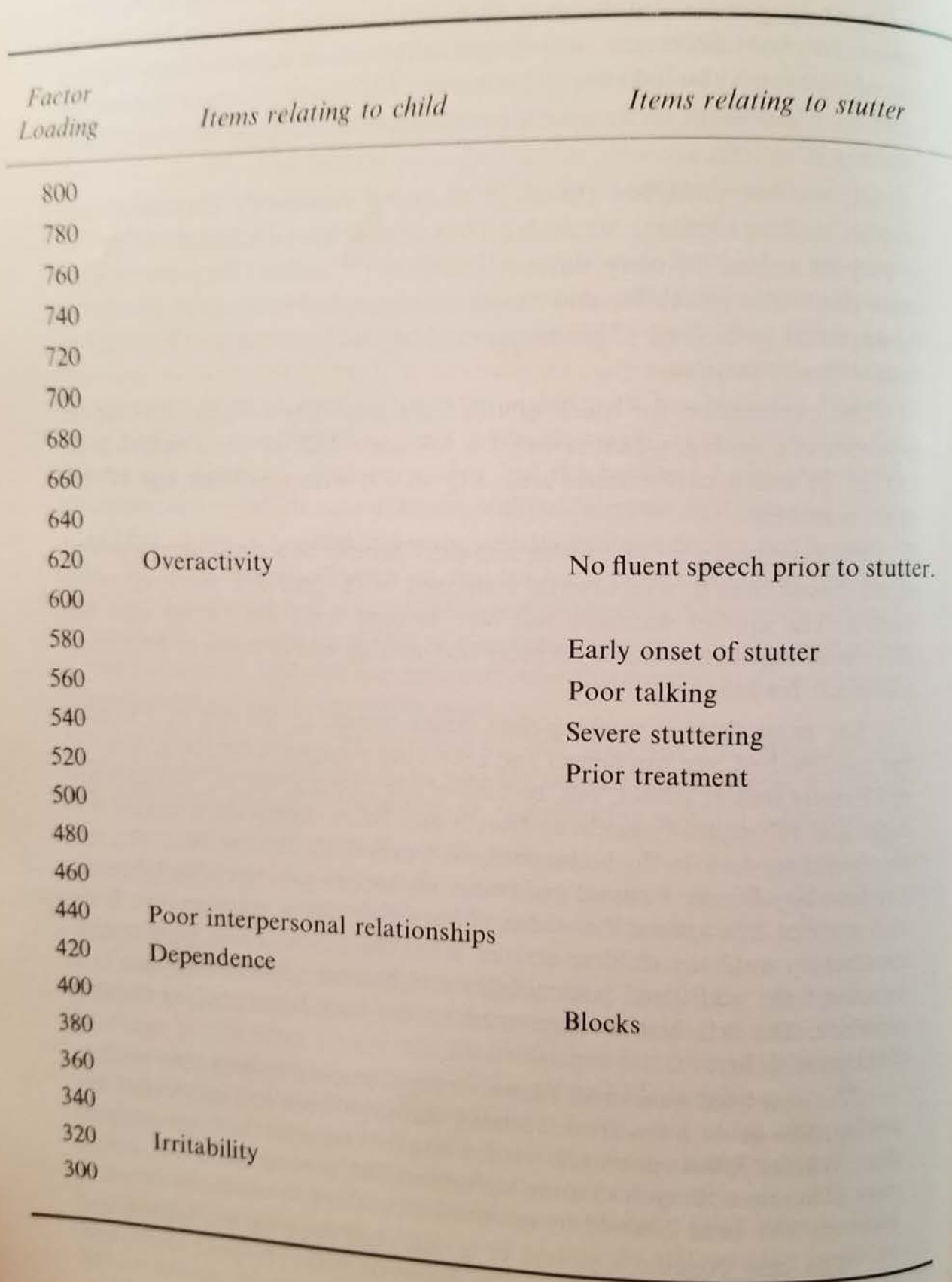


Fig. 14. Factor Analysis of 80 Stutterers

This factor is confined to items concerning the child and even then it seems to be mainly a factor descriptive of severe stuttering.

It describes the severe stutterer as a child who, after a history of poor talking but not necessarily late talking, has an early onset of stuttering without an intervening period of fluent articulation. Although beginning with repetitions, the disorder has become more complex and is now characterised by the frequent occurrence of blocks and prolongations. (Naturally severe stutterers show the other more complex symptoms too. These are not in evidence here because data about them was not included in the analysis). The child has commonly had treatment for the disorder, obviously to no avail.

The factor also includes four behaviour-disorder items; overactivity, irritability, poor interpersonal relationships and dependence. The latter two are probably a secondary manifestation of the child's reaction to the handicap of a severe stutter, but the meaning and status of the first two is less clear. It is quite probable that overactivity defines fidgetiness rather than hyperkinesis and that irritability is again reaction to the frustration of the severe stutter. In this case all four might be regarded as secondary manifestations of severe stuttering.

In some children the overactivity did have a hyperkinetic quality and so may have contributed causally. In others, the four symptoms can be viewed as indicative of a primary emotional disorder and again possibly causally related. But for most children it would seem more reasonable to view this factor as descriptive of severe stuttering without causal implications.

The distribution of the individual factor scores is normal and in keeping with the distribution of the severity of stutter in this material. The following case was a severe stutterer who scored above the 90th percentile on Factor II yet who was below the 25th percentile on Factors I and III. It is thus of considerable interest to view, as it were, a severe stutterer in pure culture.

Case 257 (C.A. 11y. 5m.)

This tall, plump, friendly lad was eager to help in every way and had a smile for each new person whom he met.

He had a normal developmental history, but although he was speaking in phrases satisfactorily by the age of two, his mother was the only person who could understand him. This articulatory difficulty persisted for some two years, and as his speech became clearer his stutter became apparent. By the age of five-and-a-half years he was receiving treatment, for it constituted a real handicap even at that early age. Treatment was not effective, and when interviewed his stutter was severe, with many repetitions, occasional blocks and some concomitant facial spasms.

He had a great many friends and enjoyed a wide variety of activities with them. He was tidy and clean and very careful of his clothes, his toys and his money. He seemed to be sensitive to the opinions of others, was anxious to please and somewhat dependent. He had always been restless and rather over-active, and at times had had periods of nail biting.

Psychometric testing revealed a full scale I.Q. of 102, a verbal scale of 94, and a performance scale of 111. He was rather handicapped in reading and his reading age was 7 years 6 months.

The home background was a happy one. The lad lived with his mother, father and elder brother in a comfortable clean house on a fairly modern estate. The atmosphere was easy and relaxed, there were many joint family activities and good contact with relatives and friends. The father was a skilled worker in an engineering firm, earning good steady money, and the mother worked as a shop assistant. The money earned was used to pay the mortgage on the house, and to provide many amenities for the home and expensive clothes and presents for the children.

The mother was the last child of a large family and had some difficulties with her own rather emotional, over-protective, elderly mother. She had a happy adolescence, meeting her husband at the age of 19 years and marrying after a two-year courtship, with due family approval.

It had been a good marriage; the husband was a good and steady worker though inclined to obsessionality. The mother reported herself as being rather 'nervy' with episodes of psychosomatic illness such as dermatitis or alopecia. She had been effectively treated for these and for the last few years had felt relaxed and well.

In this happy home, the boy had developed normally and was able to live a remarkably normal life despite his severe stutter.

FACTOR III

This factor accounts for only 7.6 per cent of the total variance but nevertheless is of clinical interest.

It describes a hypothetical child who, as well as anxiety, has a number of symptoms of an 'acting out' kind—quarrelsomeness, disobedience, irritability and over-activity. Nevertheless he is an intelligent child who reads well. He has developed a mild, rather than a severe, stutter.

His family is typically in social class I or II and is still upward-striving. The mother by virtue of her intelligence and ability has climbed the social ladder but tends to be disabled by neurotic traits, particularly those of an obsessional kind.

This factor is interesting in relation to Johnson's (1955/59) ideas of aetiology, which were derived from his excellent work with an upper socio-economic group. In this present material, which is a total cross section of a population of 80,000, the features on this factor are unlikely to be applicable to more than a minority of the stutterers. This is, however, an important minority who must communicate well in order to fulfil the promise of their high intelligence. Loadings on this factor are again not rigidly confined to a small group minority but rather distributed in a normal fashion.

In summary, this factor described an able child from a neurotic and socially upward-striving home who seemed to be reacting to this pressure with anxiety, some rebellion and a very mild stutter. It would be interesting to know if these children are similar to the benign group of stutterers described in Chapter 3, in whom the

FACTOR III

Factor Loading	Items relating to mother	Items relating to child
800		
780		
760		
740		
720		
700		
680		
660		
640		
620		
600		
580		
560		
540		
520		
500		Good reading.
480		Aggression.
460		Disobedience.
440	High social class.	Mild stutter.
420		Anxiety.
400	M's neuroticism.	Irritability.
380		Over-activity.
360	M's high intelligence.	
340	Upward social mobility	No blocks.
320		No prolongations.
300		High W.I.S.C. score.

Fig. 15. Factor Analysis of 80 Stutterers

prognosis was favourable.

As one would expect, many of these characteristics were common among the controls, Factor III being a continuum.

The following case has a score on this factor above the 90th percentile, and on Factors I and II below the 25th percentile. To that extent he is unusual, but nevertheless very instructive.

Case 207 (C.A. 10y. 6m.)

This bright, clean, fidgety little boy co-operated well at interview, and was quite prepared to talk on a variety of subjects at his first meeting with the therapist at school, and again in the car while travelling to the clinic. In fact his flow of speech demonstrated a certain degree of anxiety, because it consisted of a series of questions on the lines of 'Where are we going?' 'Why do you want to see me?' 'Do we have to go into the hospital?'

The boy had a normal developmental history except that his mother considered that he was slow to develop speech. This fact was explained away by her considering that the other children 'did all his talking for him'. Actually he began to speak within the normal time. He started a repetitive stutter when he first went to school. It had never developed into a severe stutter although his anxiety often demonstrated itself in a high-pitched voice showing excess tension. His stutter was always worst at home. His elder brother, now 15, stuttered badly but there were no other members of the family with this disability.

At the interview he was extremely anxious and very dependent, asking for support and guidance frequently during the tests. He seemed to have few friends and hardly any activities and interests outside school. He was successful in his work but made few contacts with children or adults. His mother reported him to be an anxious, worrying little boy, irritable at times, particular over his food and reserved in his feelings, although under stress he would become stubborn or resort to temper tantrums which distressed the family.

He was an able child with a full scale I.Q. of 125, verbal scale I.Q. of 126 and performance I.Q. of 118. He had a reading age of 12 years 4 months.

He lived with his mother and father and three older children in a large, attractive house in a good neighbourhood. The older children were all extremely intelligent and the father was an executive of social class II. There had been a considerable degree of upward social mobility. In spite of the obvious material success of the family, there was little sign of joint activities or indeed of any happiness together. The adults had severed all contact with relatives and had been unable to replace them with other satisfying friendships.

The mother was the last child of a working-class home. She was hostile to both her parents, giving a really horrifying description of them. She did well at school, gaining a scholarship to a Grammar School and going into the Civil Service. She met her husband at the age of 15 and married him

at the age of 20. He was quiet and reserved and, like her, had very strong religious convictions. The mother was intensely critical, both of herself and of her children. She described herself as being constantly in danger of developing 'anxieties, neuroses or depressions' and explained that it was only by being excessively methodical and living a life of rigid control, that she managed to keep going. Religion and success by work made her life worth living; her main aspiration was achievement for the children.

The anxieties in this child seemed to be particularly related to the degree of parental pressure upon him to behave well and to achieve success.

This next case, which scored above the 90th percentile on Factors II and III and below the 25th percentile on Factor I, describes the interaction between these factors and draws attention to the behaviour disorder symptoms of Factor III. In this child they are reminiscent of mild organic abnormalities.

Case 270 (C.A. 11y. 0m.)

The family of this child consisted of the parents, both of whom worked, an elder sister, and this child aged 11. A grandparent had also lived in the house for the past ten years. Both parents were busily engaged in professional occupations, and were rather more interested in the intellectual than the emotional aspects of life. The family lived in a good house which was full of stimulating activities and interests not particularly compatible with small children. The family managed to undertake a number of outings together, but there was little time when they were all relaxed at home. This was a large and well-furnished home in a pleasant residential district, although because of its social class there was little contact with the neighbours.

The mother was raised by her widowed mother who was still living with the family. She grew up as a quiet, reserved child with intellectual interests, did well academically and had continued to work ever since. She had an adequate if somewhat serious adolescence and adult life before marrying an academic professional man. Her life, which ran extremely well, was a triumph of the intellect. It was methodically organised, she suffered from no neurotic symptoms, and the children were seen as little adults so that they might conform with her interests.

This child in particular was considered by his mother to be highly intelligent and talented in the creative arts. He had a normal developmental history, achieved bladder and bowel control quickly, but lost it again at two-and-a-half years for six months. He was noted to be a physically immobile child with poor co-ordination and for a period of time suffered an orthopaedic disability. He was severely myopic and had worn glasses for a considerable period of time.

He developed speech at a normal age but, at about the age of six years, when he was moved from one school to another, he developed a mild repetitive stutter. This had slowly increased in severity, until at interview it consisted of repetitions and blocks with many facial grimaces and associated movements of the hands. The stutter at the age of 11 years was moderate in

severity and formed a slight handicap to communication. He was an inco-ordinate, myopic, restless, and fidgety child, who talked rapidly, often to himself, answering 'yes', 'no', and 'maybe' to his own questions. This talk seemed to be a means of dealing with his quite severe anxiety.

He was a lonely child, his behaviour reminiscent of hyperkinesis. He was still babyish in his concepts, his behaviour and his social relationships, although he had acquired a veneer of sophisticated interests from his parents. He had difficulty with school and could not see the purpose of attending, despite the intellectual pressure from his home. He had no friends amongst his peers, but preferred to see himself as the class buffoon. He had few rewarding interests and activities and showed considerable anxiety.

Both he and his mother described episodes which were called 'pranks' in which he was clearly out of control and which were akin to temper tantrums. He was also disobedient at times and easily made irritable by slight stress. It is interesting that, even though he was of average intelligence he was unable to draw a cube, and his school reported that until recently his writing had been illegible. On psychometric testing he scored a full scale I.Q. of 117, a verbal scale of 123 and a performance scale of 108. His reading age was 13 years 5 months. His W.I.S.C. sub-test profile was of considerable interest, showing a wide scatter with failure on items of comprehension, picture completion, and picture arrangement.

This was a child who, although exposed to considerable intellectual drive at home, was not of sufficient ability to compete and had therefore elected to become the class fool. At interview he appeared to be a hyperkinetic, distractable child with a number of behavioural symptoms which were reminiscent of poor physical and emotional control.

A further combination of these orthogonal factors is Factor I (lack of capacity in mother and child) and Factor III (capable, driving mother and average child). The following case history scores high on both and is presented to illustrate that each child stutters because of a unique cluster of factors. There are no tidy groups into which all fit without overlap.

Case 216 (C.A. 10y. 7m.)

This shy, hesitant lad avoided answering many of the interviewer's questions. He was well-dressed and clean, but appeared to shrink from social contact at first. After a while he relaxed and revealed himself to be an anxious, cross little boy, acutely unhappy in his home, his school and his environment generally.

He began well, passing all his developmental milestones easily, and was speaking clearly at the age of two years. At the age of five years, when his father deserted the home, he became distressed, lost control of bowels and bladder, and had remained enuretic and encopretic until the time of the interview. It was during this disturbing time that he also started to stutter. His speech disorder had remained mild, characterised by repetitions alone.

His mother said that since the break-up of the family he had been reserved towards her, and that he was restless and irritable and so disobedient that she had had to appeal to the headmaster for help with discipline.

Psychometric tests revealed a full scale I.Q. of 85 with a verbal score of 86 and a performance score of 87. He had a reading age of 8 years 5 months and was reported by the psychologist to have little motivation on the tests.

He now lived with his mother and younger brother. The father had been a salesman, but five years ago he went abroad intending the family to follow in a few years. Unfortunately, he met another woman and divorced his wife. She had continued to work as a shop assistant throughout. The mother and children, at the time of the survey, lived in restricted circumstances in a poor housing area with only one bedroom for the three of them. There was little family life and no joint activities. The family was dependent upon the maternal grandparents but had few other adult friends.

The mother was the eldest of three children of a middle-class family. As a girl she was always ill and often in hospital for indeterminate diseases. She had a difficult school career but did well when she began to work in a shop. She had worked for one firm throughout, and has been promoted steadily from salesgirl to mannequin to stock buyer. She had a gay and busy adolescence, during which she met her husband and was courted for two years. Just prior to her marriage she became severely depressed and had to be admitted to hospital for treatment. When she recovered she married, and was apparently extremely happy for the first seven years until her husband went abroad. Since his desertion she has been anxious, tense and irritable, feeling that she could not cope with her work and often becoming despondent, depressed and weeping. She was a dominant, ambitious person with high standards, but because of her financial straits and her current environmental conditions she was unable to achieve the standards she would like. This had resulted in considerable recent distress.

This child, of low average intelligence, was currently unhappy and anxious, and reacted to these feelings by a number of symptoms of behaviour disorder. It is interesting that this increase in emotional disorder did not increase the severity of his stutter.

A Possible Fourth Factor

A small proportion of the children had very low scores on all three factors. Five of the 15 children with the lowest scores had a positive family history of stuttering and it may well be that in these children genetic influences were sufficient to initiate stuttering unaided. Positive genetic factors were obvious in 30 of the total 80 stutterers.

Family history of stuttering or the genetic predisposition to stutter has acted like an orthogonal fourth factor throughout this study with minimal correlations with the other three factors. This was evident, before the factor analysis was carried out, from the correlation matrix and from the multiple regression calculations.

Children with a family history of stuttering were found to be no different in any of the other features from those without stuttering relatives. In the factor analysis a positive family history was only randomly associated with high loadings on the other three factors. This could mean that it is operative only in some cases, or, more likely, that it is important in all but only evident in some.

The following cases scored below the 25th percentile on all three factors. The family history was the only significant finding which could be related to their stuttering.

Case 201 (C.A. 10y. 7m.)

This lad appeared to be younger than his age, and was poorly-dressed with rather grubby clothes, hands and hair.

His developmental history was normal, in fact he walked and talked rather earlier than is usual. His mild stutter, consisting of easy effortless repetitions, started when he first went to school and was now never heard at home, although the headmistress referred to it as a 'minor handicap' at school. He was a pleasant lad who made many friends and was delighted to have been made a class monitor, saying that he liked to 'be important'.

Psychometric tests revealed a full scale I.Q. of 103, a verbal scale of 101, and a performance scale of 104 with a reading age of 12 years.

He lived in an untidy council house with his father and mother, and was the second of four boys. Two of his brothers stuttered but no anxiety was expressed about this. The atmosphere in the home was easy, happy and relaxed and there were many family outings and activities, with regular contact with relatives and friends of all ages.

The mother was a pleasant, untidy, untroubled woman who was born in a working-class family and who took over the running of the house when her mother died. During the war, whilst a member of the W.A.A.F., she met her husband and married him with the approval of both families. After the first five difficult years when they lived with her father, the marriage went well, and in a home of their own they had been completely content. A period of anxiety when her husband had tuberculosis was surmounted with some strain, but he was now back at work and things were going well.

The boy seemed to be a normal lad of average intelligence from a happy home, without evidence of emotional disorder.

Case 204 (C.A. 10y. 10m.)

This rather thin, bright-faced boy was lively and interested in the survey and eager to help in any way.

His developmental history was normal and his speech was clear and fluent until the age of four, when he started to repeat sounds and syllables. The stutter slowly increased in severity until on interview it consisted of definite blocks as well as eye-blinks and mouth-twitches.

He was a friendly boy with an active mind. He had plenty of friends

and a fund of interests and activities, although he had a fairly low stress tolerance, and would quickly become irritable and lose his temper. This emotional reactivity was apparent in his quick, bird-like physical movement.

On psychometric testing he proved to have a full I.Q. scale of 125, a verbal scale of 126, and a performance scale of 120. His reading age was 11 years 8 months. He was a normal intelligent child with no evidence of emotional disorder.

He lived with his mother, father and elder sister in an attractive, well-kept house in a good area, with plenty of friends and good contact with relatives. Both his father and paternal grandfather were stutterers, but this had not prevented the father from having a successful service career nor from holding a skilled job at the time.

The mother was a well-dressed, attractive, and pleasant-spoken woman. She was the eldest of four children and had a happy childhood until her mother died when she was 14. She then relinquished a scholarship to Grammar School and stayed at home to care for her younger siblings. She coped very well with this and had a satisfactory and happy adolescence with many interests and activities. She met her husband during the war and married at its conclusion. Their two children represented a planned family and she considered that they were very content. She was able to make friends easily, run her house efficiently, and give considerable emotional warmth to both her children. If anything, she was a little too competent and her husband occupied a subsidiary role in the family hierarchy.

It is as well to remember that although these case histories illustrate the direction and meaning of the various factors, they must not be regarded as characteristic of the average stutterer. An equivalent case history of the respective control is really needed to bring them back into perspective, particularly as the mothers of stutterers were found to be no more and no less neurotic than the mothers of controls, and stutterers themselves were no more and no less emotionally disturbed than the control children.

Discussion and Conclusions

The basic task of this chapter was to illuminate the probability that stuttering was not a unitary disorder but the result of a number of antecedents which are expressed through a final common pathway.

The information gained from these 80 stutterers is similar to that obtained from the longitudinal survey of stutterers reported in Chapter 3. In both groups there is an association between stuttering and late and poor talking, stuttering and mild intellectual deficit, and stuttering and social pathology in the home.

However, in the school survey there is much more information about the speech disorder itself and a considerable amount about the syndrome can be learnt from a study of this. In this population sample of 10-year-old children, two-thirds had only a mild stutter when relaxed and at ease. During the initial, presumably stressful, interview, however, half of them were prevented by their stutter from communicating freely.

The children had begun with a mild repetitive stutter, but by ten years most children had developed prolongations, blocks and associated body symptoms. Anxiety that was consciously related to speech situations was not prominent at this age, usually being confined to school situations. This orderly development is in accord with Bloodstein's experience quoted earlier, and is quite consistent with the growth of the symptoms as a learned response. The duration of stutter seemed to be closely related to severity, as though the disorder took time to develop.

The age of onset of this presumably mixed bag of benign and persistent stutterers paralleled that obtained in the longitudinal survey, with stuttering occurring about a mode of five years and very seldom after ten. Articulatory defect or 'poor talking' seemed to count as a year or two of stuttering. Some children who were severely handicapped by poor talking at the age of three or four were noted to be stuttering as they became intelligible, and surprisingly soon were quite severely handicapped by their stutter. Thus severity of stuttering was related more to the length of fluent speech experienced by the child than to the chronological age at beginning to stutter.

Severity of stutter poses a difficult problem. In the first analysis of stutterers and control children, when it alone was selected for inclusion and used as a criterion, severe stutterers were not significantly different from mild stutterers in respect to the other 36 items. This might suggest that, while the initiation of stuttering could be determined by many factors, increase in severity and complexity might be seen as a matter of learning alone. In the second analysis of the 80 stutterers, which included other items related to severity, Factor II emerged. This carried severity of stutter on its axis and included other items which described the severe syndrome well; little fluent speech, early onset, prior treatment, blocks and prolongations (associated symptoms were not included on the data tape), dependence and poor interpersonal relationships. All of these are consistent with the severe syndrome being elaborated as a learned response. Unfortunately there are three items on this factor—overactivity, irritability, and poor talk—which suggest that at times the severe disorder is a product of a predisposing factor involving the central nervous system.

Thus we arrive at the heart of the matter; does this investigation throw any light on the problem of why people stutter?

Factor I is important. It indicates the way in which stutterers differ from controls, not only in this material but in the 1,000-Family Survey too. It suggests that many stutterers come from poor homes where there are mothers who have difficulty in coping. Furthermore, the stutterers themselves appear to be handicapped in their ability to think, talk or behave. In fact this factor suggests that, given the predisposition to stutter, this lower ability to cope would ensure that those with a high loading would fail to graduate from the ranks of stutterers. It would seem that stuttering is a developmental disorder, like enuresis, which most children grow out of. Thus when it persists abnormally it is proper to seek the reason.

In these children, then, the reason could well be their inability to cope, with speech as well as other things. This inability is only randomly associated with a

severe stutter, the occurrence of late onset of stutter on the factor being a consequence of the late talking rather than indicative of an especially mild stutter.

The children described by Factor III are able, yet despite this advantage they too develop a stutter. Their stress would appear to be the driving emotional pressure at home. Unable to cope with this, they become anxious, their speech fluency fails, and they develop a stutter. Typically they have a very mild repetitive stutter, significantly free of blocks or prolongations, which is presumably a manifestation of their anxiety, particularly over their speech.

What then makes a severe stutterer? The 'fourth factor' of family history is possibly important in initiating the original repetition, but, correlating zero with severity, it can hardly be called to account. The genetic predisposition to stutter is distributed evenly throughout the material, and, seeming to correlate with nothing, it could well be an important predisposing cause. If this is so, perhaps the other factors simply determine whether or not the stutter will become manifest.

Thus Factor II remains. As stated previously, many of its items are consistent with the development of severity as a learned response, and for most stutterers this may well be the case. The inclusion on the factor of items of possible neurological import, which are unlikely to be secondary, suggests that they either potentiate the learning of a severe stutter or else they represent some basic organic 'dysphemia' which independently produces severe stuttering.

Fortunately it is not necessary to solve this problem, for as the factors are orthogonal elements, in the individual case all four factors can be called to account. The clinical histories that were included have demonstrated this point.

There is one remaining problem. Ten per cent of the cases had very low loadings on all four factors. The most likely possibility is that they had an unknown genetic predisposition to stutter, for with low penetrance this would be common. In their case were there other conditions that predisposed to stuttering, which in this small study were not statistically evident? Such are the limits of this investigation.

The Genetics of Stuttering

Introduction

Most authorities agree that there is a tendency for stuttering to 'run in families'. A genetic link has been suggested between stuttering and left-handedness (Bryngelson 1940) and between stuttering and twinning (Berry 1938). A study of the incidence of stuttering in twins was made by Nelson *et al.* (1945), while Wepman (1939) and West *et al.* (1939) tried to show, in careful studies, that the tendency for stuttering to run in families is due to genetic transmission, and not to imitation of one member by another.

Wepman paired 250 stutterers (some taken from speech clinics) with 'unselected' non-stutterers for age, sex, and social environment, discarding cases where stuttering was present in the immediate family. In the families of 250 stutterers he found 310 relatives who stuttered, an average of 1.24; in the families of the control group he found 57 relatives with stutter, an average of 0.23. Sixty-nine per cent of the families of stutterers and 16 per cent of the families of the controls contained one or more members with a stutter—a highly significant difference.

In the study by West *et al.* data was obtained on the incidence of stuttering among the extended families of 204 probands and 204 controls matched with them for age and sex. In the families of the stutterers there were 210 relatives with a stutter, an average of 1.03, while in the control families there were only 37 stutterers, an average of 0.18. In this study information was obtained concerning over 6,000 relatives in each group; in the families of the stutterers the incidence of stuttering amongst the relatives was 3.34 per cent, in the families of the controls 0.56 per cent.

Unfortunately, modern genetic statistical techniques were not used in these studies and a great deal of information is lost. There are no data about the frequency of stuttering in the two most important classes of relatives, parents and sibs, and we cannot tell how far the method of selection may have affected the results. However, both investigations provide evidence of a familial tendency to stutter which is probably of genetic origin, although nothing is known about the mode of transmission.

Present Study

Selection of cases

The method of selection of the Survey families has already been described. Two probands belonging to the same family were encountered only once, a case of probably monozygotic twins who, for the purposes of the genetic study, were regarded as one individual. There are thus 78 probands. Information was obtained about the siblings, parents and, to some extent, other relatives. A family investigation was also made of two other groups, Groups A and B, which are together referred to as the Clinic cases.

Group A consisted of 83 children seen in the Speech Therapy Clinic during the period 1950 to 1953—65 boy and 18 girl probands, with a mean age of 6 years and a range of 2 to 14 years.

Group B consisted of 52 cases, comprising all the adolescent and adult stutterers under treatment at the Clinic during 1963. Information was obtained by interview and by completion of a detailed questionnaire concerning the sexes and ages of all sibs, parents, uncles and aunts and recording those who stuttered. There were 46 male and 6 female probands. Their mean age was 20 years, with a range of 14 to 43 years.

Half-sibs, and parents about whom nothing was known, were discarded, as were families in whom the children were adopted. A relative was classed as a stutterer if an unequivocal history of stuttering over a period of several months was obtained; positive responses had to indicate that the stuttering phenomena of repetitions, prolongations or blocks had been present.

In the Survey material it would have been surprising if more than one proband had been ascertained in each family, and in fact this occurred only in the case of the twins already mentioned. Ascertainment was, therefore, incomplete, and selection corresponded to the method known as 'single selection' (Neel and Schull 1954). In calculating the risks among sibs the probands themselves are omitted (Weinberg's proband method, Larsson and Sjögren 1954). The same method was used for Groups A and B.

In the material as a whole, the same family was in a few instances ascertained more than once. When this happened, the Survey proband was regarded as the index case, or if there was no proband in the Survey material, the Group B proband was counted. Thus the same family never appeared in more than one of the groups.

Correction for differences in age distribution and calculation of morbidity risks among relatives

The risk period was taken as from 3 to 12 years inclusive. Our own Survey data, and the 1,000-Family Survey (Miller *et al.* 1960) both show that the percentage of the risk of stuttering passed at different ages is approximately as follows.

TABLE 83
Percentage of risk of stuttering passed at different ages, and weighting coefficients

<i>Age in years</i>	<i>Risk passed</i>	<i>Weighting coefficient</i>
0-2	0%	0.0
3	10%	0.1
4	30%	0.3
5	50%	0.5
6	60%	0.6
7	70%	0.7
8	80%	0.8
9-12	90%	0.9
Over 12	100%	1.0

The brothers and sisters (sibs) of the probands were therefore given a 'weighting coefficient' ranging from 0.1 at the age of 3 to 0.9 at the age of 9 to 12 years. For

TABLE 84

Risk of stuttering, per cent, among first and second-degree relatives

			Survey Cases	Clinic Cases		Totals
			Risk (per cent)	Group A Risk (per cent)	Group B Risk (per cent)	Risk (per cent)
Parents	...	...	9.7	16.4	11.6	12.9±1.7
Sibs	...	...	11.1	15.7	18.2	14.4±1.9
Uncles, Aunts	...	...	—	—	4.7	4.7±1.2

instance, all those aged 5 were given a 'weight' of 0.5, indicating that, at this age, half the risk of stuttering had passed, and half remained.

In calculating the morbidity risk per cent (R) for each class of relatives, the following formula was used (derived from Strömberg, 1935): $R = 100 \times N/D$. The numerator (N) is the number of stutterers among the relatives. The denominator (D) is the number of relatives (living or dead) multiplied by the appropriate weighting coefficient.

The risks of stuttering among the relatives of the probands

(i) *First-degree relatives.* The risks per cent for stuttering among the parents and among the sibs in each group are shown in Table 84, using the formula given above.

Among the Survey cases the risk among the parents was 9.7 per cent. Among the sibs of probands the risk was 11.1 per cent. In Groups A and B the risks were somewhat higher, but the Survey cases probably provide the best estimate, since there may have been a pre-selection of families with more than one stutterer in the Clinic material.

TABLE 85

Risk of stuttering, per cent, in male and female relatives

			Survey Cases	Clinic Cases		Totals
			Risk (per cent)	Group A Risk (per cent)	Group B Risk (per cent)	Risk (per cent)
Mothers	...	...	5.3	6.2	9.6	6.8±1.8
Fathers	...	...	14.3	26.5	13.7	19.1±2.8
Sisters	...	...	4.4	12.7	10.9	8.4±2.1
Brothers	...	...	17.1	19.7	27.0	20.3±3.2
Mothers and Sisters	...	...	4.9±1.7	8.0	10.3	7.5±3.1
Fathers and Brothers	...	...	15.8±3.1	24.4	19.9	19.6±2.1

The risks among the male relatives were 3-4 times as high as among the female relatives, (Table 85), as was to be expected in view of the different sex incidence in the general population.

Again, for both sexes the risks among the Clinic cases (Groups A and B) tended to be somewhat higher than in the Survey material.

(ii) *Second-degree relatives.* A systematic attempt to obtain information about affected and unaffected uncles and aunts was made only in the case of the Group B probands. Of the 337 uncles and aunts, 16 were reported to be or to have been stutterers (4.7 per cent). In Group A, the risk of stuttering was estimated to be approximately 4.3 per cent.

(iii) *Twins.* Twins are of special interest because in one of the two varieties (the monozygotic) twin pairs are genetically identical. There were four pairs of twins in the whole material. One pair was probably monozygotic, and both members stuttered (Survey cases). The remainder consisted of two unlike-sexed pairs, in one of which both twins stuttered, and a pair of probably dizygotic twin boys, both of whom stuttered. None of the parents or the six sibs of these twins was affected.

Some characteristics of the pedigrees

Direct transmission through three generations, which is usually to be regarded as a feature of dominant inheritance, was reported in five families. In one family the father and *maternal* grandfather were affected. In addition there were eight instances of a grandparent being affected when neither parent stuttered.

Naturally, there was probably some under-recording of cases among grandparents, and little weight can be placed on the precise figures. In a condition as common as stuttering, moreover, direct three-generation inheritance might occur in as many as 10 per cent of families, even with recessive transmission. There is, however, another feature of the pedigrees that deserves mention. This was the strong tendency for the affected relatives to be either on the paternal or the maternal side of the family, and not on both. Excluding families in which a parent was affected, there were six families with two stutterers (uncles, aunts or grandparents) among the antecedents and collaterals, and in each case both members belonged to the same side of the family. As already mentioned, there was only one family with an affected parent and an affected grandparent on the other side. This observation suggests the presence of dominance, though not necessarily of a single major dominant gene.

Sex of proband and risk among relatives

When the male and female probands are considered separately, the risks among their relatives are found to differ somewhat.

Among the sibs of *female* probands, the risk of stuttering is 22 per cent, among the sibs of *male* probands 12.4 per cent. The standard errors are rather large, however, and the difference is not significant. Among the parents of *female* probands, the risk of stuttering is 16.9 per cent, among the parents of *male* probands 12 per cent. This difference is not significant either. But if the parents and sibs are taken together, then the risk of stuttering among the relatives of female probands (20.2 ± 3.5 per cent) is significantly greater than the risk among the relatives of male probands (12.2 ± 1.3 per cent), at the 5 per cent level of confidence.

TABLE 86

Risk of stuttering, per cent, among relatives, according to sex of proband

No. of probands	Survey Cases		Clinic Cases				Totals	
			Group A		Group B			
	Male (64)	Fe-male (14)	Male (64)	Fe-male (18)	Male (46)	Fe-male (6)	Male (175)	Female (38)
Mothers	4.8	7.7	6.3	5.8	8.7	16.7	6.4	8.3
Fathers	10.2	33.3	26.2	27.7	15.2	0	17.6	25.7
Sisters	0	25.6	11.3	19.6	10.9	11.1	6.1	19.4
Brothers	15.6	26.8	15.3	31.9	26.2	32.3	18.7	29.9
Mothers & Sisters	2.5	16.2	7.7	9.0	9.8	13.3	6.3	12.9
							± 1.4	± 4.1
Fathers & Brothers	13.1	30.2	23.1	29.2	20.2	17.9	18.2	27.5
							± 2.2	± 5.8
All Relatives	7.9	23.0	15.4	20.2	14.7	15.3	12.2	20.2
							± 1.3	$\pm 3.7^*$

*Significance of difference = $P > .05$

The greatest risk of all is found among the male relatives of female stutterers (27.5 per cent); the next highest risk is among the male relatives of male stutterers (18.2 per cent); next, among the female relatives of female stutterers (12.9 per cent); and least among the female relatives of male stutterers (6.3 per cent)—Table 86.

The effect on the risk among the sibs of having an affected parent

It is often desirable in genetic studies to examine as a separate group the families in which one or both parents are affected. For in these families there is presumptive evidence that the trait has been transmitted, whereas in families with neither parent affected there is more likely to be an admixture of acquired cases, if these exist.

In the material as a whole there were 53 probands with one stuttering parent, and one family in which both parents stuttered. The risk among the sibs in these families and in those without an affected parent is shown in Table 87.

In the family with both parents affected there were six children, including the proband. Of his five sibs, two were under the age of 3 years, and of the older sibs only one stuttered. But all the sibs were very young, and had not completed the period of risk. In the families with one affected parent, there were 20 sibs of probands who stuttered, a risk of 31 per cent. Presumably because of a selection of families,

TABLE 87

Risks, per cent, among sibs of probands with and without affected parents.

Survey cases		Clinic Cases		Totals
		Group A	Group B	
With both parents affected				
All sibs ...	—	66.7	—	66.7
With one parent affected				
Sisters ...	11.4	39.5	26.1	25.1
Brothers ...	29.2	22.2	49.6	35.3
All sibs ...	22.2±8.8	30.1	39.1	30.9±5.7
With neither parent affected				
Sisters ...	3.3	4.3	6.9	4.7
Brothers ...	14.6	15.7	16.5	15.3
All sibs ...	9.0±2.6	10.2	10.8	9.8±1.9

the risk was somewhat higher in the Clinic than in the Survey cases. Turning to the families in which neither parent was affected, there were 24 sibs who stuttered, a risk of 10 per cent. The great majority of sibs came, of course, from these families, but only a little more than half the stutterers.

Discussion

1. *Is there a familial tendency to stutter?*

In Chapter 3, the incidence of stuttering among the general population during childhood and adolescence was estimated to be about 3 per cent, and in Chapter 1 it was concluded that the risk of stuttering is about twice as high in boys as in girls. Hallgren (1950), during his study of congenital dyslexia, examined a group of non-dyslectic schoolchildren as controls, and found an incidence of stuttering of 3.9 per cent among boys and 2.1 per cent among girls. We seem to be justified then in taking the risk among boys to be about 4 per cent and among girls about 2 per cent. (These figures are, of course, not prevalence rates, but include cases which have recovered).

The risk of stuttering among the sibs of the Survey probands (11 per cent) is significantly higher ($P < .01$) than the population risk of 3 per cent. The risk among brothers alone is higher than the risk among male children in general, but the risk among sisters is not significantly above the 2 per cent estimate for girls in general. If mothers and sisters are taken together, however, there is a significant increase in risk ($P < .05$). The results of this Survey therefore agree with the conclusions of Wepman (1939) and West *et al.* (1939), that there is an increased incidence of stuttering in the families of stutterers.

2. *Is the family tendency to stutter due to genetic or environmental factors?*

There is no certain way of distinguishing, from statistical data alone, the effects

of genetic transmission from those of shared environment and culture. The evidence must be evaluated as a whole. It includes the nature of the trait itself, the degree to which the observed segregation ratios approximate to the ideal mendelian ratios, and the environmental factors. There are opposing schools of thought about stutters, one upholding the importance of constitutional (including the genetic) elements, and the other emphasising environment, particularly the psychological aspects. Both explanations may be valid, but one advantage of the genetic hypothesis in general is that it explains why some relatives resemble each other and others do not; for genes segregate according to well-established laws. On the other hand, if the environmental hypothesis were true, then affected members of a family would be expected to have had similar experiences not shared by the unaffected members, and this has not been demonstrated, so far as we are aware, in the case of stuttering.

It has been suggested that *imitation* might account for the occurrence of stuttering in more than one member of a family. Children acquire speech and language by imitating those around them, and if stuttering were the normal manner of speech, then all children would presumably learn to stutter. But it is very doubtful if 'stuttering' learnt in this way would show the compulsive quality of ordinary stuttering; instead of persisting for years, as it often does, it could quite readily be replaced, with training, by normal speech, just as different languages can be learnt. Moreover, the majority of stutters are not in close contact with even one other person who stutters. In our own Survey cases only 20 per cent had been in close association with another stutterer (see also West *et al.* 1939).

Even when a close association does exist, one would expect children to learn the speech pattern of the majority of people in their environment, unless they have a specially intimate relationship with the person who stutters. However, there are no reports of stutters having a closer relationship with other stutters than with those who speak normally. Moreover, if stuttering arose from imitation, the whole pattern of the stutter would presumably be imitated precisely, but there is no evidence of this. Nor can the theory account for the preponderance of male stutters.

Physical environment

No evidence of any environmental feature shared by the stuttering members of a family and not by the others has been found in our material, or in the literature. In individual cases physical illness seems to have been related to the onset of stuttering, but this does not help to explain the familial tendency.

A study of concordance among twins ought to throw some light on the problem, since, in their early years, twins commonly experience a similarity of environment, psychological and physical, greater than that of ordinary sib pairs; and if environment were important, concordance for stuttering would be higher among twin pairs than among ordinary sibs. This argument would apply to both monozygotic (MZ) and dizygotic (DZ) twins. But if heredity were the main factor, then a high rate of concordance would be found only among MZ pairs, and DZ twins would be no more alike than ordinary sib pairs. Unfortunately, Nelson *et al.* (1945) and Graf (in Johnson 1955) give conflicting results, so that no conclusions can be drawn, although the method remains of potential value.

At the present time, therefore, there is insufficient evidence of a purely environmental cause for familial stuttering. Non-specific factors in the environment (such as anxiety in the mother) may, however, bring to light an innate predisposition to stuttering, genetic transmission of which should be considered as a possibility. First, however, we shall examine the possible causes of the altered sex ratio.

3. *Why does stuttering affect boys more than girls?*

Stuttering appears more prevalent in males than females, although the difference is less marked in early childhood than later in life. Explanations fall into two main categories.

(a) *Social and psychological hypotheses.* According to these, the sex-ratio depends on specific psychological differences, on inequalities in the demands made on boys and girls, and on different methods of upbringing. If this were true, we should expect girls who stutter to resemble boys in some psychological aspect, or to have experienced the pressures to which boys are exposed. There is no indication of this, and it seems more likely that the distinction arises from inborn constitutional differences between girls and boys (see Sex-limitation).

(b) Two possible *genetic explanations* for an altered sex ratio are available:

- (i) *Sex-linkage.* When a trait is controlled by a gene situated on a sex chromosome, it is said to be sex-linked. But neither the general sex ratio of 2 boys to 1 girl, nor the family data in our material, can be accounted for by sex-linkage.
- (ii) *Sex-limitation.* When the expression of the same genotype is different in male and female, the gene is said to be sex-limited.

Partial degrees of sex-limitation are very common in man, baldness, harelip and gout being examples. Boys and girls differ in a number of morphological and physiological characteristics, in addition to the purely genital ones. For instance, girls on average show greater physiological maturity at all ages than boys (Tanner 1955). These differences are presumably also due to sex-limitation of the effects of certain genes. Thus, the relative maturity of girls might, for example, make it easier for them to acquire fluent speech and render them less prone to stutter.

4. *What is the mode of transmission, assuming that transmission is through genes?*

Having found the psychological and environmental theories unsatisfactory for want of evidence, we shall now consider the data from a genetic aspect. However, genetic inheritance, whether single gene or polygenic, does not by any means rule out the possibility that other, non-genetic, causes may also be at work; indeed, a complex and varying disorder of function, such as stuttering, is *a priori* likely to be the result of a number of converging forces.

(a) *Single gene transmission.* Certain other common deviations from normality, such as congenital word-blindness, enuresis, or even left-handedness, also show familial aggregation, and single factor transmission has been regarded probable (Hallgren 1950, 1957, Falek 1959). We are not suggesting an analogy with the rare, grossly pathological conditions in which the emergence and course of the disease is determined wholly by the presence of a major dominant or recessive gene.

If a single gene were responsible for stuttering, then, with dominance, one parent (occasionally both) would be affected, and half the sibs of probands would

on average be affected. If the gene were recessive, seeing that stuttering is so common, about one-fifth of the parents and one-third of the sibs of probands would on average be affected. A moderate reduction in rate of manifestation, or some degree of sex-limitation, would be quite compatible with dominance (though not with recessive inheritance). But the risks actually observed are very much lower, both among parents and sibs, than is to be expected on either the dominant or recessive hypothesis. The need to assume a reduction in rate of manifestation of about 60 per cent for male relatives and over 80 per cent for female relatives considerably weakens, though it does not altogether exclude, the hypothesis of dominance, but it virtually rules out recessive inheritance. Uncomplicated single factor inheritance fails to account adequately for the data. Before considering other possibilities, we may examine the evidence for heterogeneity.

It is perfectly possible that stuttering might be due to two or more different processes. Clinically, the great variability in age of onset, duration and severity suggests that this may be so. Stuttering may occur in gross organic brain disease, or transiently, from emotional shock. But the bulk of cases cannot be attributed to such causes. There might however be a mixture of cases, some depending on the presence of a dominant, some of a recessive gene, and still others in whom the disorder was wholly acquired. Analysis of the family data has shown that when one or both parents are affected, the risk of stuttering among the sibs of probands is as high as 31 per cent. However, even this risk is significantly lower than the expected minimal risk figure (50 per cent) compatible with simple monogenic transmission, whether dominant or recessive. With dominance, the rate of manifestation among sibs would be reduced by about one half.

It is among the group without an affected parent that non-genetic cases of stuttering are most likely to occur. Here, the parental genotypes might be any of the following: $(S)n \times nn$ or $(S)n$ (where (S) = the dominant gene for stuttering, with failure of manifestation, and n = the normal gene); $Ns \times Ns$ (where s , the gene for stuttering, is recessive); or $NN \times NN$. None of these matings would by itself give rise to 10 per cent of stutterers among sibs of probands. In the case of the mating $NN \times NN$, stuttering in the proband would be acquired, or, possibly, due to mutation. We have not, however, been able to identify any features, such as birth injury, physical illness or traumatic events during childhood, as characteristic of this group of probands. It may be noted, too, that even in these families the risk among sibs is higher than the population frequency.

In conclusion, while stuttering may be a heterogeneous condition, it is not possible to say with any confidence how many of the cases are acquired and how many of genetic origin.

(b) *Polygenic inheritance.* The marked divergence of the observed risks from those expected with simple dominance, or recessivity, indicates that modifying genes play a large role. The altered sex-ratio, which is probably due to sex-limitation, points in the same direction. If we assume that a specific gene is not present at all, and that transmission is entirely due to a large number of unspecific genes, we arrive at polygenic (multifactorial) inheritance.

This is the mode of transmission of continuously distributed, quantitatively graded and universally occurring characters, such as stature, intelligence and birth weight. No particular gene is essential, and the genetic basis is provided by a number of genes, each of minor effect, acting in aggregate. Edwards (1960) has pointed out that some *discontinuously-distributed* characters may also be under the control of polygenes, if the concept of 'threshold' is introduced. What may then be inherited is an underlying predisposition; when this reaches a certain degree, a clinically recognisable departure from normality may appear. This hypothesis has been put forward for conditions such as epilepsy, some types of psychiatric disorder, and hypertension. Environment is often important, but its contribution to the total variability depends on the range of environmental conditions occurring in the population.

With certain assumptions, the risk of the trait in question appearing in the relatives of probands may be calculated. Edwards (1960) has shown that, in general, when the frequency of a character in the population is p , the risk among first-degree relatives is \sqrt{p} . In the case of stuttering, assuming the population frequency to be .03 (3 per cent), the risk among parents and sibs would be .17 (17 per cent). This is a better approximation to the observed risk than is given by either of the single factor hypotheses (dominance, recessivity).

Sex of proband. Taking the risk of stuttering in the general male population to be 4 per cent, and in the general female population to be 2 per cent, then according to our data, the risks among the relatives of the male and female probands are increased in the manner shown on Table 88.

TABLE 88

		Risks per cent and standard errors	Ratio to risk in same sex in the general population
Female relatives of male probands	...	6.3±1.4	3.2
Male relatives of male probands	...	18.2±2.2	4.6
Female relatives of female probands	...	12.9±4.3	6.5
Male relatives of female probands	...	27.5±5.7	6.9
	TOTAL	13.7	4.6

These results may be accounted for in terms of polygenic inheritance as follows. Let us consider stature. Here, among males, the normal distribution curve for height is placed to the right of the curve for females, assuming tallness lies to the right. Now, if we take an absolute standard of height, say 6 feet, as an arbitrary threshold, women over this height are more exceptional, in relation to the mean stature of their sex, than are men of 6 foot in relation to the mean stature of the male sex. Tall women therefore produce, on average, more children of over 6 foot than males of the same height. Parents of either sex produce more tall sons than tall daughters; but mothers over 6 foot tend to have more tall children of either sex than tall fathers. Also, tall women have tall parents and tall sibs more often than do tall men.

If we look upon the ease with which fluent speech is acquired as a continuously graded character, like stature, then we might suppose that, at a certain distance from the average, a point would be reached where fluency was lost. This would represent the threshold at which stuttering occurred. If we also assume that the distribution curves for 'fluency' in males and females are not superimposed, but that the male curve is shifted towards the stuttering end, then the sex of the proband will affect the risk among relatives in the same way as in the case of stature.

(c) *Polygenic inheritance or a dominant gene with multifactorial background?*

Polygenic inheritance is capable of explaining the data, provided that a number of assumptions about predisposition and threshold are made. At present, there is little direct evidence that these assumptions are true. Our data suggest that stutterers tend to be late in acquiring speech. There are also the so-called developmental stutterers (Métraux 1950), and the 'sound-syllable repeaters' (Davis 1939). Research on the fluency with which speech is acquired within families might throw light on these matters.

Another difficulty in accepting the polygenic hypothesis is the need to account for a disability, which may last throughout life, by the chance combination of a number of individually normal genes. Actually, secondary effects, such as habit, may account for the perpetuation of stuttering in some cases. But the objection may be overcome if it is assumed that in the genetics of stuttering there are two components, a common dominant gene, and a multifactorial background with sex-limitation. A model of this kind has been put forward (Carter 1961) for hypertrophic pyloric stenosis, a condition in which there is also a preponderance of male patients, but a higher risk among the relatives of female patients. As already pointed out, some evidence for dominance in our family data was provided by those pedigrees in which stuttering was known to have occurred through a number of generations. The aggregation of secondary cases was almost wholly on one or other side of the family and not on both. It is however at present impossible to choose between these two hypotheses, in both of which the environment may produce decisive effects.

Conclusions and Summary

1. In both sexes the risk of stuttering among the first degree relatives of probands was 3 to 4 times higher than the risk in the general population. Since it is difficult to account for this increase in risk through the operation of non-genetic factors alone, a genetic explanation is preferred for the familial cases. Non-specific environmental factors, such as low intelligence, social incompetence or anxiety-proneness amongst the mothers, may however bring to light a latent predisposition to stutter. Among the non-familial cases, an unknown proportion may be wholly acquired.
2. The altered sex-ratio among stutterers is compatible with sex-limitation, due to the action of modifying genes. It is pointed out that sex differences (in addition to purely genital ones) exist in children and that girls show relatively greater physiological maturity at all ages. The ease with which speech functions are acquired may be related to this.

3. The sex of the probands affects the risk of stuttering among the relatives. The highest risk occurs among the male relatives of female stutterers, and the lowest among the female relatives of male stutterers. An analogy with stature is drawn.
4. Simple monogenic inheritance does not account for the data unless a reduction in rate of manifestation of very marked degree is assumed. This virtually excludes recessive inheritance. Transmission by a common dominant gene with a multifactorial background appears to be a reasonable hypothesis. Alternatively, inheritance may be wholly polygenic. In either case sex-limitation operates. It is impossible to decide between these two alternatives at the present time.

The Inhibition of Stuttering by Syllable-Timed Speech

Clearer understanding of the causes and development of stuttering should lead eventually to more effective treatment. Although we treat patients who stutter, a critical assessment of our results or a comparison of different methods of treatment was not part of this enquiry. In this chapter we record an unfinished experiment into the effect of one traditional procedure, and we do so, not to commend it as therapy, but to test our hypothesis that the established stutter is a form of learned behaviour. In preparing for this we became more sensible than before of the volume of thoughtful work already published, especially in the United States, and of the limitations of our own experience.

It is appropriate to consider some of the therapeutic concepts and methods in use at the present time before describing our specific application of syllable-timed speech.

Contemporary Concepts in Treatment

The present treatment of stuttering is difficult and time-consuming, and the outcome often unsatisfactory. Despite considerable study, there is neither a universal method applicable to all cases nor a particular procedure which can be relied on to give consistent results in selected individuals. Contemporary programmes of therapy would all seem to contain two essential components, an appreciation of the complex barrier which a disorder of communication interposes between the sufferer and society and the confidence of the therapist in his ability to assist the stutterer to find a way through this barrier. The methods used appear to lie along a continuum, from those that focus upon treatment of the symptom, to those which deal with the stutterer alone and tend to ignore the stutter. During the last two decades there has been a considerable change of emphasis so that symptomatic therapies are less in vogue, and treatment by psychotherapeutic techniques alone have assumed more importance.

1. *The Treatment of Adolescents and Adults*

The conditions under which a stutter was reduced or disappears were reviewed by Bloodstein. One of the most effective was speaking to a metronome or speaking in time to rhythmic movements. Methods of treatment on this general principle have been in intermittent use for at least a century. Van Dantzig (1940) described speaking in regularly stressed syllables as a simple expedient for the relief of the stutter. She considered that in some this would be sufficient in itself although in many it would need to be supplemented by other methods of treatment.

Hypnosis, which was also noted as a technique reducing the severity of stuttering, has continued to be used sporadically, either as a supplementary method to other systems of therapy (Moore 1946), or for direct inhibition of stuttering by post-hypnotic suggestion (Mason 1960).

Exploitation of the inhibitory effect of masking the stutterer's perception of his own speech was used by Cherry and Sayers (1956). Although extremely effective inhibition of the stutter resulted, no detailed follow-up study of the patients has been published. Similar and more promising work was reported by McLaren (1963) utilizing the techniques of masking and of shadowing, and in many cases the resulting improvement has been lasting.

A more direct approach is practised by Hemery (1957). He maintains that stutterers have faulty speech habits which should be corrected by progressive re-education in the proper use of the vocal apparatus. This technique, which would seem to rely to a large part on the personal qualities of the therapist involved, has undoubtedly resulted in some degree of improvement at the end of a prolonged course of speech training.

The current interest in behaviour therapy has resulted in some attempts to remove the symptom of stuttering by techniques based on learning theory (Eysenck 1960, Walton and Black 1958). These individual case reports are of interest because they are formally derived from the concept of stuttering as a learned response.

2. Treatment of the Stutter and the Stutterer

Practitioners of this approach consider that it is not sufficient merely to remove the symptoms, as there is a secondary disorder of relationship between the stutterer and society. Van Riper (1958, 1959), one of the most experienced workers in the field, in reviewing symptomatic therapies differentiates sharply between those which seek to prevent the occurrence of stuttering and those which aim at modification of the stutter. He considers that those in the second group which attempt to teach the stutterer to talk without stuttering are basically repressive in nature, doing little to relieve the emotional and relationship problems which are either a primary or secondary manifestation of the stuttering. He suggests that such methods are unwise, for not only are their results short-lived, but subsequent failure engenders feelings of guilt, frustration and helplessness in the stutterer.

The essence of Van Riper's approach is the use of 'expressive and dynamic symptomatic therapy.' In this, the stutterer is to exhibit, understand and control his symptom, to understand its fluctuation in different situations and to understand its meaning for him. He is also encouraged to understand the strengths and weaknesses of his personality, their relationship to himself as a stutterer and the readjustments that will be necessary when he is no longer handicapped. The basic technique is to encourage the stutterer to stutter openly, using easy repetitive patterns or other forms of easy stuttering until the word is finally said. The therapist encourages tolerance of stuttering in others, and tolerance in the patient himself, both to his own stuttering and to the reactions of listeners. This results in a reduction of the associated anxiety.

Practice is given in entering previously difficult situations until these can be attempted without anxiety even though stuttering still occurs. The subjects learn to eliminate their word and situation avoidances and concentrate on assessing the actual nature and occurrence of their own stuttering in an objective fashion. Concurrent with this expressive work on the speech, a therapeutic relationship is developed which encourages personality growth, with understanding of attitudes towards stuttering and towards communication with significant people. As personal stability

and independence increase, methods of voluntary control of the stutter are taught. These include 'cancellations' and 'pull outs' so that at this point in therapy the stutterer becomes able to control the duration of his abnormality, and in fact to stutter so briefly that the listener will not react and the symptom is no longer a handicap. The understanding and commitment of Van Riper himself has obviously played a central part in his system. The results of his experimental treatment groups show that at follow-up, five years after therapy, half of 137 severe stutterers were either stuttering so mildly as to be no longer handicapped in any way or not stuttering at all (Van Riper 1958).

Van Riper's technique is probably best considered as a complex and successful therapy whereby the stutter is divorced from the occurrence of anxiety, whether this arises from external environmental cues or from intrapsychic conflict. Once divorced from its anxiety it is no longer reinforced and so the habit slowly becomes extinguished.

Sheehan (1958) in discussion of the treatment implications of his conflict theory of stuttering puts this more succinctly. 'When stuttering is viewed as an approach avoidance conflict operating at different levels, the fundamental goal of treatment becomes very clear. To eliminate all tendency to avoidance whatever the source. Word fears and situation fears involving the more superficial levels of conflict are attacked most directly through speech therapy. Feelings, relationships, and defences are reached through psychotherapy. In each case the basic goal is the same; to reduce the avoidance and its sources, permitting the stutterer to attack each communicative act as freely as possible.'

Many other workers advocate a similar approach although perhaps few have expressed it with the clarity of Van Riper or Sheehan. Fawcus (1962) described group work with stutterers in which the aim has been to change the attitude of the patient towards his stutter, while helping him to modify his abnormal speech patterns. These aims are facilitated by working in a group. This trend towards the treatment of the whole stutterer was evident as early as 1941 when Kingdon-Ward stated 'there is no such thing as the best method of treatment, for no single system could ever include all possible means of benefit.' She advocated a multidisciplinary approach in which general relaxation played a considerable part in the early stages of treatment, and was followed by reorientation of the stutterer towards himself and his stutter. The direct attack on speech was by the use of 'speech relaxation' exercises consisting of prolongation of the vowel and continuous consonant sounds. This technique is still in widespread use in England.

3. Treatment of the Stutterer Alone

Although there is a considerable amount of psychotherapy in the complex techniques just described, some workers feel that psychotherapy alone is a sufficient and proper method for the treatment of stuttering.

Barbara (1960, 1962) considers that stuttering occurs in either disturbed neurotic children or in emotionally vulnerable children, but that once a child is afflicted by stuttering he becomes different from the other children and so develops a hierarchy of secondary neurotic manifestations. Thus for him the syndrome has two aspects, a primary intrapsychic disturbance and a secondary interpersonal disturbance. Barbara appears to utilise a form of psychotherapy in which many of the more

formal and classical ideas have been altered specifically to meet the needs of stutterers. He draws attention to the need to obtain, as well as a more formal psychiatric history, a detailed account of the onset and development of the stutter and the patient's own feelings and attitudes to it throughout its remembered development. It is also essential to explore the manner in which the stutter is used, positively or negatively, in the stutterer's relationships with others. He considers that the stutterer's disorder of communication is not only related to speech, but also consists of an inability to communicate emotion effectively. He likens the stutterer to the obsessional neurotic, in whom defence by intellectualisation is a prominent feature of the condition and forms an important resistance in therapy. He encourages the therapist to get behind this intellectual resistance by using free association and dream recall.

The resistances which must be worked through include those to treatment itself, to the establishment of the analytic relationships, to the interpretations by the therapist, and even to the idea of fluent speech itself, and their resolution forms an essential part of the therapy.

Barbara regards the stutterer as having an idealised image of himself which compensates for the disability and thus makes him unwilling to participate in treatment, for treatment may mean a reduction in his defences and reassessment of his own attitudes and values. In the course of therapy, the stutterer emerges towards maturity becoming less dependent upon others. In the end 'he tends to discard his neurosis and all that implies—including stuttering.' This is achieved by a therapeutic situation which provides a sense of belonging and an atmosphere of unity, in a controlled environment where the stutterer is able to act out his symptoms to his best interests.

Such a system, although derived from classic analytical concepts, places less weight upon the reactivation and exploration of early conflicts and more upon the use of the therapeutic relationship for ego building and reality testing. In many ways, it is similar to the treatment of the stutterer in the complex speech therapy advocated by Van Riper. Barbara does not appear to have published any results of his work.

To other therapists (Glauber 1958, Wyatt 1962), stuttering is evidence of a disturbed parent/child relationship and therapy involves a more formal elucidation of the conflicts and defences surrounding this problem. Formal psychoanalysis for stuttering is practised by many, usually on the basis of the theoretical formulations proposed by Fenichel or Stein (see Chapter 2). It has been noted that stutterers do not do particularly well in analysis, not only because of the resistances to therapy but also because the severity of the stutter acts as a barrier to communication.

Treatment of the school child

It is possible to adapt the methods already described for use with children. An interesting development of speech therapy has been the independent establishment by Sovak (1948) and Allen (1955) of special arrangements within a school system for the treatment of stutterers. In Czechoslovakia they attend a special school, in England a special class in an ordinary school. Children's work in each of these classes is a combination of special speech therapy and general school lessons. After a number of years in this environment, the children gradually learn to accept their stutter, to venture

more readily into speech situations both at school and at home, and to control the severity of their stutter by various methods. The results appear to be extremely encouraging, for almost all children improve significantly. In the English study, 80 per cent of the children who have been followed for between 12 and 14 years have become adults with normal speech. This is a far better result than the improvement to be expected by spontaneous remission.

The strength of this method is that, within a structured environment acceptable to the child, where considerable attention is paid to his emotional and social needs as well as to his speech, a gradual dissociation of anxiety from stuttering occurs and the speech improves. The quality of the long-term improvement thus obtained suggests that this practice should be more widely followed in this age-group.

In England, few school-age stutterers are fortunate enough to be treated in this manner, and most attend weekly sessions at a speech therapy clinic run by the local education authority, or at the local hospital. In short treatment sessions, therapists usually attempt to help the child over the worst of his symptoms by the use of easy stutter techniques, repeat-reading or relaxation, and by encouraging the child to feel free to express himself, to talk about the things that interest him and about his needs and wants. Sometimes this is conducted with small groups of children, a practice which allows the therapist to spend a greater length of time with the child. Jameson (1955) states that at follow-up one year after the end of treatment it was found that normal or near normal speech had been achieved in a third of the school-age children. This result, from a skilled therapist in a hospital clinic, is inferior to those of Allen with her more intensive therapy within the school setting.

It is customary to involve the mother in treatment as well, in an attempt to help her understand the disorder and modify her relationships with the child. Analytically orientated workers such as Courtman-Davies (1962) and Glasner (*cit.* Barbara 1962) find that techniques of expressive play therapy, with or without the requisite interpretation, result in a lessening of the stutter. An important part of these techniques is the concurrent counselling of the mother.

Therapy with the pre-school child

In treating the pre-school child the emphasis is entirely on working with the mother. The therapist tries to help her to understand the nature and implications of stuttering and what she can do about it.

Wyatt (1962) recommends giving advice and information about language learning and stuttering and about the child's need for closeness and intensive verbal interaction. She also helps the mother to tolerate and manage the child's clinging, fearfulness and aggressiveness.

By far the greatest proponent of counselling mothers is Johnson (1955, 56, 59). His own diagnostic theory sees stuttering as commonly originating in the mother-child relationship. He advises mothers to do nothing to call the child's attention to the interruptions in his speech. He encourages them to notice what a fluent and good talker the child is on occasions. He forbids them to label the child as a stutterer and encourages them to allow the child to express himself freely and easily in a secure, permissive family environment.

It is difficult to assess the results of such counselling, although Johnson (1955) does present evidence to show that in 50 children mean age 4 years 2 months from upper socio-economic groups, whose parents were counselled, three-quarters had normal speech, one-eighth were improved and one-eighth the same when followed up 2½ years later. This finding is difficult to evaluate because of the high spontaneous remission rate that occurs in this age group. Indeed, in our study of the stutterers in the 1,000-Family survey, we found that the rate of spontaneous remission over a period of 2½ years was over 50 per cent.

It seldom appears justifiable to treat pre-school children intensively, and an approach through the home and the mother would seem to be more rational. In quite a significant proportion of young stutterers there are also developmental defects of articulation, and in order to assist the child towards the attainment of intelligible speech more formal speech therapy may be indicated (Lewis 1942).

It is difficult to compare one method with another because no precise measurement of the stutter before and after treatment is given. We recognise that quantitative definitions of the kind we have used for the purpose of this enquiry and which we describe in Chapter I cannot be regarded as a total assessment of the problem; yet measurement there must be if the rational components of therapy are to be defined and valid insight into the merits of different therapies obtained. We hope that by describing our method even for one aspect of treatment we shall encourage others to publish their results in a comparable way.

In this experiment we have used a form of syllable-timed speech. The way it was used and the effects which followed are presented here in relation to our general concept of the nature of stuttering. Its place in treatment cannot be assessed until the experiment has continued for several years.

To avoid frequent repetition of a long phrase we shall describe the method as S.T. speech.

The Subjects

Thirty-five people took part; 30 were patients coming in the ordinary way to the clinic for treatment and five were selected from the School Survey children. The 30 patients who ranged in age from 16 to 45 years were divided into three groups.

The first group (A1) comprised ten adult males who varied in occupation from labourer to physician. Five had stable personalities, four manifested a number of neurotic traits and one had an immature personality. All were of average intelligence or better and the mean I.Q. for the total group was 115. Prior to treatment eight of them had severe stutters which had been present for a long period of time, and were severely handicapped in verbal communication. Of the two others, one had a moderate stutter and one had a mild stutter on initial testing, but at times both could be almost inarticulate. The mean severity of the group was 36.5 per cent of words stuttered at a mean rate of 58 words per minute.

The second adult group (A2) comprised nine men and one woman, and was matched with the first adult group for intelligence, social class, age, Maudsley Personality Inventory scores and for the severity and nature of their stutter. The mean severity

in this group was 35.4 per cent words stuttered at 51 words per minute. Nine of the ten had severe stutters and one a moderate stutter.

The eight boys and two girls of the adolescent group (B) were between 16 and 19 years of age; all were single, and employed in skilled trades or clerical occupations. They showed a greater degree of anxiety and obsessional traits and two were considerably handicapped by neurotic disorder. They were of average or above average intelligence, the mean I.Q. of the group being 110. On admission four had severe stutters, five had moderate stutters and one had a mild stutter. The mean severity was 21 per cent of words stuttered at 64 words per minute.

The five boys in the children's group (C) coming from the School Survey were all aged 11. All were reasonably well-adjusted children with good relationships with their parents and with their peers. One was prone to anxiety and another reacted to stress by becoming passive and compliant. All were of above average intelligence, the mean I.Q. for this group being 115. Prior to treatment three of them had severe stutters, while two stuttered moderately, the mean severity for the group being 20.4 per cent words stuttered at 86 words per minute.

Details of the individual characteristics for each member of the four groups and their progress with the use of S.T. speech may be found in Appendix 3.

The Method

The 35 subjects were taught to use a form of speech from which all the stress and syllable contrasts were removed. They were taught to speak syllable by syllable, stressing each syllable evenly and saying each in time to a regular even rhythm. This for us is syllable-timed speech. It is not particularly difficult but if stutterers are to become proficient at it they need considerable practice. Most of our subjects had up to 100 hours' practice, most of it intensively in the first 10 days. Initial practice was conducted in the clinic, but the remainder was carried out in the community, particularly in situations which they had previously found difficult. The steps involved in the technique can be divided into four stages.

Stage 1. On the first morning with the group each patient discussed and recorded the history of his stutter. He then read a selected prose passage which was also recorded. A detailed analysis was made of the severity and type of stutter present, and these recordings on the first morning served as the base line from which alteration due to S.T. speech could be calculated.

The general aspects of the stutterer's personality, life history and adjustment were explored. Each subject completed an intelligence test and a structured personality test (Appendix 3). Interviews were conducted which explored not only the developmental history of the stutter but also the subject's personal and psychiatric history with particular emphasis on the presence or absence of neurotic traits.

Stage 2. S.T. speech was taught within the group. One by one all subjects repeated a simple sentence, firstly with the therapist and then after him. The sentence was one in which all words were reduced to single syllables, each syllable sharing equal stress and equal timing. After they had mastered this the original test prose passage was again read, first in unison with the therapist but later individually. Simple abolition

of the stutter was not considered satisfactory, for the subjects were required to be capable of speaking without any significant stress or syllable contrasts. Repeated practice in saying this passage was maintained until all subjects were competent. Practice was then obtained in reading passages from the daily newspapers, first in unison, later individually. This was continued until all subjects were error free.

When this point had been reached, and this was usually some half to three-quarters of an hour after the beginning of the session, spontaneous speech was encouraged. Spontaneous conversation using S.T. speech was begun in a very structured and formal manner by playing childish word games, such as 'I Spy' and 'Twenty Questions'. This ensured that the first return to spontaneous speech was based on an almost automatic pattern of communication easing the transition from reading and hastening the establishment of stutter-free conversation.

Very quickly, as the subjects gained confidence, these word games would be interrupted by the asides and interjections of normal conversation. During this time such stutters as did occur were immediately cancelled by having the subject repeat the phrase paying even more attention to the timing. At the conclusion of the first two-hour session almost all of the 35 adult and adolescent subjects were speaking freely in S.T. speech at the rate of about 80 syllables a minute without any trace of stutter. In the children's group, however, the teaching of S.T. speech had to begin with a general discussion about the syllable itself. Although the children were soon speaking in unison they took far longer to use the S.T. speech in ordinary conversation and it was not until the fourth or fifth day that they did this consistently.

Stage 3. The daily practice sessions constantly changed their character with each therapist and within each group. If the first session had been quite authoritarian, the practice sessions certainly were not. Like any group brought together over a reasonable period of time they developed their own relationships and behaviour and began to explore their own interests and needs. The task of the therapist was therefore not only to ensure that their speech was syllable-timed but also to encourage this exploration of attitudes and anxieties concerning stuttering.

Each day the initial practice began with reading and slow correct S.T. speech, and when everyone had completed this satisfactorily a simple discussion was started. Discussions became more wide-ranging as fluency improved and rates of speech increased to normal levels (somewhere between 100 and 150 syllables per minute). Concurrent with this increase of speed and fluency came a return of the stress contrasts of normal speech. No mention was made of this to the subjects, and in fact it was tacitly encouraged as long as they did not stutter.

Most of the first few days were spent in the clinic practising S.T. speech, but after this an increasing number of outings and tasks were arranged. Each group in turn seemed to decide when it was ready to go out into the community and soon all were making long and detailed enquiries in shops, buses, travel agencies, libraries and railway stations. Some members became so carried away with their ability to communicate freely that they had to be restrained from asking trivial questions of every shop-girl or bus conductor just for the joy of talking. Others were reluctant to go out into the community and use this artificial form of speech, feeling that it

sounded abnormal. It was in this diverse situation that the group morale was invaluable, supporting the anxious hesitant members and restraining the brash and over-confident ones.

Towards the end of the practice session the subjects spent less time in the group and more time out upon individual tasks. These were often just the activities which at the beginning of the course they had stated were difficult or impossible. In addition each group devised various testing situations in order to prove their ability to talk.

Little information was given to the relatives beforehand about this experiment, and so the subject had to go home and explain to his family just why he was talking in that particular way and what he hoped to gain from it. The family's comments were by no means always encouraging, and each subject had to cope with them as best he could. Similarly each stutterer had been encouraged to mention at work that he was coming for treatment of his stutter. Thus having committed himself he would be more inclined to make a serious attempt to speak well on his return to work.

An encouraging growth of personality seemed to take place in many of the subjects. This was unexpected in so short a time, but it must be remembered that the two weeks represented 100 hours of group instruction and practice. The groups were not originally structured or run as psychotherapeutic groups but the members became aware of the individual needs and anxieties and endeavoured collectively to deal with them. In group (A1) little attention was directed to this aspect of the disorder, but with group (A2) considerable time was spent discussing those misconceptions about stuttering that form such a disabling part of the established syndrome. Because the group was a closed and progressive experience, the learning of new attitudes and ideas seemed to occur. The therapist did not correct attitudes or solve problems, for real solutions arose naturally, as they do in any coherent sympathetic group, when they were needed and the members were ready to accept them.

Stage 4. At the conclusion of their intensive ten-day attendance at the clinic various arrangements were made for follow-up for each group. Adults and adolescents all met regularly at least ten times in the next ten weeks for hour-long sessions. In these each person would relate his experiences since the last meeting and discussion followed on the problems which had been encountered.

All were encouraged to use formal slow S.T. speech. Subjects who were progressing well found this to be impossible, as they wanted to talk more quickly and more fluently, but those who still had difficulty were prepared to slow down and use the formal technique. Electric metronomes were used to set a rhythm for further practice in slow formal syllable-timed speech. A personal hearing-aid metronome was tried but it proved unsuitable.

During this follow-up period the closed nature of the groups ended and subjects from all the groups met together. This was a mistake for it ended the spontaneous discussion of attitudes and anxieties and meant that the weekly sessions were mainly devoted to the practice of S.T. speech. It would have been wiser to continue with separate groups. The subjects continued to ask advice upon use of the S.T. speech. They were told that the natural tendency would be for them to revert to normal syllable-contrast speech as soon as they stopped concentrating. When this occurred,

all would be well unless they stuttered. If they did they should then immediately control the stutter with S.T. speech and persist in its use for the rest of that day. They were advised that if their stuttering reached significant levels they should do formal S.T. reading practice at home. The extent to which these instructions were followed varied, mainly with the individual's conviction of the value of the method.

Because of the many factors involved, it is difficult to assess the results of therapy. Stuttering, because it can often be measured and assessed in quantitative form, can be more readily assessed than many other conditions. There is one major difficulty, however, and that is the variability of stuttering with the speech situation. To assess the speech of the subjects at the follow-up clinic only was clearly unsatisfactory, for many learnt to speak fluently to the therapists and yet continued to have difficulty in other settings. The subject's own report of his progress was not reliable, for both denial of symptom and extreme self-criticism were common responses.

In an attempt to create a standardised stressful situation, at three-monthly intervals the stutterers were invited to a formal interview with a senior member of the University staff whom they had never met before. The subjects knew that they had come to have their speech assessed and the 'examiner' made no special attempt to place them at their ease, but went straight to their stutter, the use of S.T. speech, and their adjustment to everyday life. A few of the stutterers used S.T. speech in the first three-monthly interview but apart from this all used normal speech, thus demonstrating the true degree of their improvement.

These interviews were recorded and the first 200 words were analysed using Sander's (1962) Criteria for Disfluent Words. The rate of speech and the percentage of words stuttered was calculated and compared with samples obtained before treatment began. At rather longer intervals information about progress was also obtained from the stutterer's families by means of a questionnaire which covered the severity of stutter, increase or otherwise in self confidence, and willingness to talk.

Results were referred back to the three-point scale for severity in which the percentage of words stuttered is an integral part. In order to compare comparable clinical groups, severity of stuttering must be represented in an exponential rather than a linear fashion, i.e. if the frequency of stuttering is reduced from 40 per cent to 10 per cent of words, the improvement is not three-quarters as the reduction in frequency would suggest, but less than one-third, for the subject is still a moderate stutterer and has a long way to go to recover completely.

Summary of Results

Thirty-two males and three females between the age of 11 and 44 practised S.T. speech intensively over ten days in an endeavour to control their stutter. They were reviewed every three months for periods ranging from 6 to 12 months. The practice of S.T. speech resulted in both a reduction in the frequency of their stutter and a general improvement in their speech. The progress of the four groups can perhaps best be seen from Fig. 16. Before treatment each group had a mean frequency of stutter of more than 20 in every 100 words, that is, in the severe range, but after the intensive course in S.T. speech this was markedly reduced. At the three-month

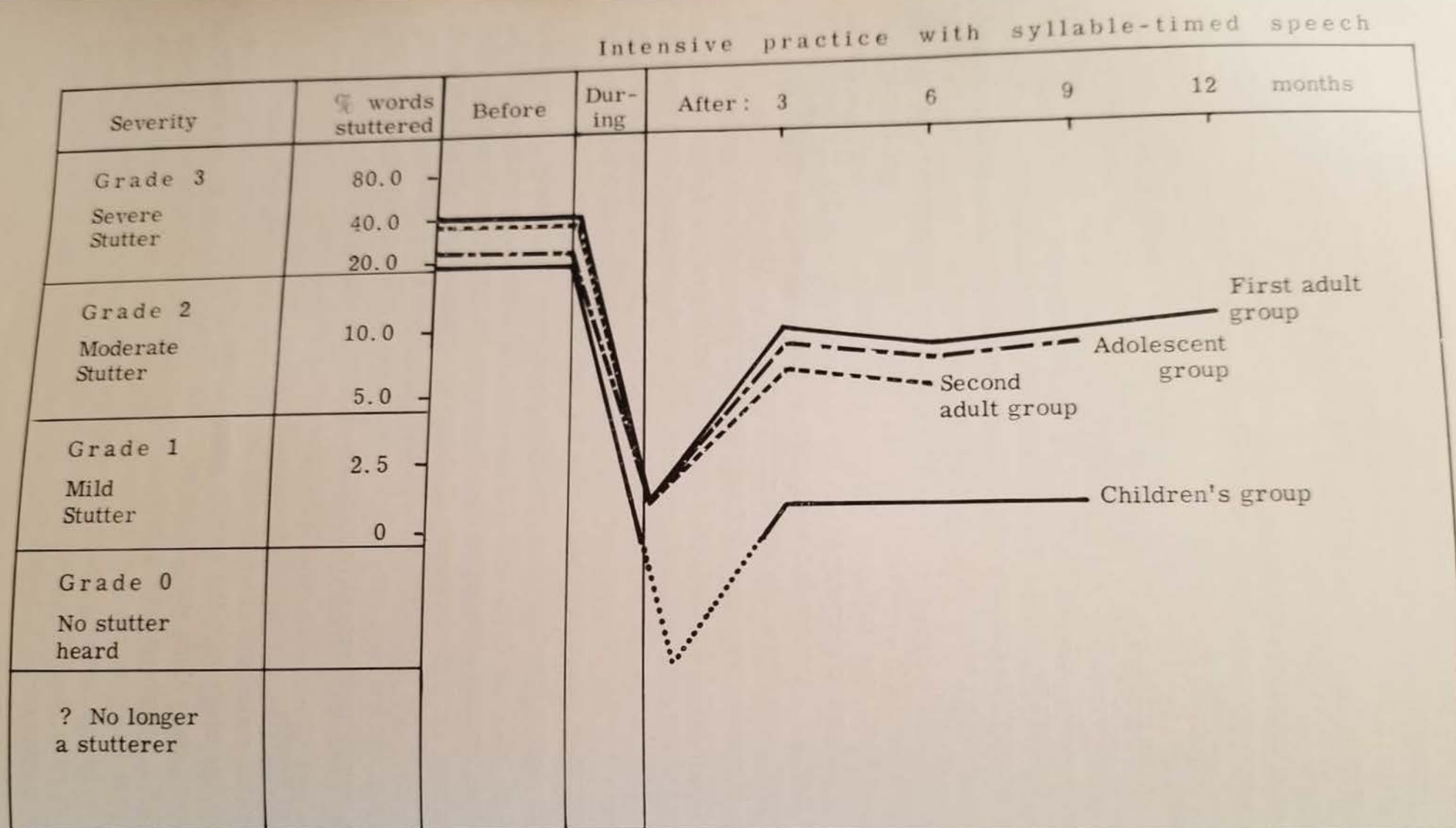


Fig. 16. Relation of each group's mean percentage of words stuttered to practice with syllable-timed speech

review each group had undergone some degree of relapse, but from then on the improvement was maintained although towards the 12-month point there appeared to be a further trend for relapse to occur. The four groups were treated in different ways in different surroundings and often by different teams of therapists. The only constant factor was S.T. speech and its intensive practice over a ten-day period. It is interesting that the graph of results for each group should have so similar a shape.

TABLE 89 Group A1.

<i>Grade of Stutter</i>	<i>On Admission</i>	<i>At 3 Months</i>	<i>At 12 Months</i>
3 Severe: over 30% words	8	2	2
2 Moderate: 6-20% of words	1	4	5
1 Mild: 0-5% of words	1	3	1
0 Not heard at Interview	0	1	2

The results for group A1 may be seen in Table 89. Besides the improvement in their speech, there has been a reduction in the limitation of activity imposed upon them by their stutter. All but one appear to have expanded their interests and social activities, and are reported by their families as more confident and more willing to talk freely in various situations. Many said that they were able to work better because of their greater ability to communicate, and in five of the ten this has been recognised by promotion. There were no unpleasant side effects from the treatment, neither increasing anxiety nor the appearance of neurotic symptoms.

Those with limited improvement consider the technique a considerable help in meeting difficult and stressful speech situations.

TABLE 90 Group B.

<i>Grade of Stutter</i>	<i>On Admission</i>	<i>At 3 Months</i>	<i>At 9 Months</i>
3 Severe: over 30% words	4	2	2
2 Moderate: 6-20% of words	5	2	2
1 Mild: 0-5% of words	1	6	4
0 Not heard at Interview	0	0	2

The results for the adolescent group B may be seen in Table 90. Their results are comparable with those achieved with the first adult group, A1. In these two groups, little attention was paid to the secondary emotional problems associated with stuttering, and we feel the poorer results obtained in these groups must be attributed in part to our failure to deal with this problem.

TABLE 91 Group A2.

<i>Grade of Stutter</i>	<i>On Admission</i>	<i>At 5 Months</i>	<i>At 6 Months</i>
3 severe: over 20% words	9	2	2
2 Moderate: 6-20% of words	1	2	0
1 Mild: 0-5% of words	0	2	5
0 Not heard at Interview	0	4	3

The second adult group, A2, in which attention was paid to the secondary emotional aspects of stuttering, appears to be making better progress. Although all had similar teaching and practice sessions this group spent considerable time working through the problems and anxieties concerned with stuttering. The follow-up period is as yet much shorter, but the result at the sixth month is superior to that of the two previous groups. In this group there was one man who, although able to learn the technique initially, soon began to have difficulty and by the tenth day was stuttering just as severely again. Despite continued effort he has never been able to achieve fluency with the use of S.T. speech and still stutters as badly as before. At the three-month and sixth-month follow-ups this man and another were the only two who had significantly relapsed. The remaining eight were much improved with little or no residual disability. This may be seen from Table 91.

TABLE 92 Group C.

<i>Grade of Stutter</i>	<i>On Admission</i>	<i>At 3 Months</i>	<i>At 9 Months</i>
3 severe: over 20% words	3	0	0
2 moderate: 6-20% of words	2	0	0
1 mild: 0-5% of words	0	2	2
0 Not heard at Interview	0	3	3

* The children's group has done significantly better than either the adult or the adolescent groups. The children were Phase 2 or Phase 3 stutterers and had little in the way of secondary complications. Furthermore, because of the method of their selection, they had little in the way of primary neurotic disability. Their improvement is satisfactory and appears to be stable in four out of the five boys. The results for this group may be seen in Table 92. One of the gratifying aspects of their improvement has been the free and unselfconscious manner in which the children used S.T. speech. Four months after treatment they all changed schools, going to Grammar or Technical schools. Although each child admitted to a certain

amount of tension and anxiety upon entering his new school there was no return of the stutter. The schools report that the children talk freely and well, and the parents are delighted with the change.

We attempted, in the 30 adults and adolescents, to assess the personal characteristics which accompanied a satisfactory result. The subjects were divided into two sections—13 who were substantially or partially improved and in whom the improvement appeared stable, and 17 who were partially improved and relapsing or who had not improved at all. The numbers are too small to permit statistical analysis but in the light of clinical experience the following observations are probably valid.

- * Improvement seems to be related to age, for 60 per cent of those who made satisfactory improvement were over 22 years, whilst only 30 per cent of those whose improvement was unsatisfactory were in this category. A possible explanation of this is that, as the children did well because they were in Phase 2 and Phase 3, then many of the older adults did reasonably well because they had left Phase 4 for the relative peace of Phase 5, when the emotional aspects of the stutter are less acute. The adolescents did not do particularly well, because most of them were definitely Phase 4 stutterers and the disability was still an acute and disabling emotional problem.

- * The personality of the subjects seems to have an important effect on their progress. Of those who did well 70 per cent were free of neurotic traits while in those who did poorly only 30 per cent were in this position.

Those who did well and those who did poorly had the same mean severity on admission, 31 per cent of words stuttered. Those who were not stuttering at all at final interview had a mean stutter before beginning treatment of 22 per cent of words. Those with a partial but maintained improvement, who on final interview were stuttering moderately, had a mean stutter before treatment of 39 per cent of words. It thus seems that among those who achieve a stable result one course of S.T. speech results in a reduction of about 20 per cent of words stuttered, the level of their final improvement being closely related to the severity of stutter before treatment. In the group who did poorly no such relationship obtains.

Analysis of the results of this project suggests that the best results are obtained when, in addition to the practice of S.T. speech, an opportunity is provided for the group to express together their attitude and anxieties about stuttering, so that they learn to overcome, not only their fear of words, but also of situations which previously provoked the stutter. The stutterers who do best are those who are reasonably free from anxiety or other neurotic symptoms. The level of improvement appears to be linked to the initial severity of the stutter so that a severe stutterer might expect to become a mild stutterer and a moderate stutterer to approach the non-stuttering category.

Discussion

- * Syllable-timed speech effectively inhibited the stutter in all cases for at least a few days and in the majority of cases the effect of this inhibition was still evident at 1 year. This would be unusual if the S.T. speech relied for its effectiveness on some ephemeral distraction effect.

• Yet a return of the stutter in a major or minor degree has occurred in most of the subjects. In some cases relapse began even while the intensive course of therapy was in progress, but in most this did not occur until the third month. In those subjects followed for 9 or 12 months there has been no further serious relapse during this latter period. Their progress during the next two years will be a more stringent test of therapeutic success, but this must await our continuing observation.

At this stage we have no wish to comment on whether S.T. speech will become a useful part of treatment. The results in the first adult group and in adolescents were not very encouraging, for stable improvement occurred in only 8 of the 20 patients and only 3 are without any handicap to communication.

The results were more promising in the second adult group where some attempt was made to treat the person as well as the symptom. The children treated at eleven responded best of all, and this is not unexpected as the crippling secondary manifestations of Phase 4 had not developed and their main need was for help with the disordered speech itself. Nine of the 15 members of the last two groups have achieved stable improvement, and all to a level where there is no longer difficulty in communication. Nevertheless, because of the short period of follow-up, we must expect that in many, without further practice in S.T. speech, the stutter will recur to a greater or lesser extent.

There is no precise information about the mode of operation of S.T. speech. Yet it is clearly important in any consideration of the aetiology and pathogenesis of stuttering to study this phenomenon and to ask precisely how it works.

If it could be shown that stutterers did have delay in the auditory perception of their own speech, then we might entertain the suggestion that speaking out the words in short syllable pulses with gaps of silence between gives time for the delayed feedback to be perceived before the next syllable is attempted.

S.T. speech is, of course, nothing more than speaking in evenly separated 'chest pulses.' Delayed feed-back, however, does not explain the period of relative freedom from stutter that occurs after the course of intensive treatment even when S.T. speech is not being used.

• There is considerable evidence to show that however simple repetitive stuttering begins, its progressive elaboration is due to reinforcement of the abnormal speech pattern by increasing anxiety in relation to particular words and particular situations involving speech.

If we accept the fact that people learn to stutter on certain words in certain situations, then S.T. speech is learning an alternative speech habit — a new language — with which the stutter is unassociated. With the intensive use of S.T. speech and a rapid increase in fluency, these words and situations no longer give rise to anxiety and so cease to be cues for stuttering. This breaks the vicious circle of simple stutter, anxiety increasing the stutter, and increasing anxiety with reinforcement of the stutter; and we know that when S.T. speech is used continuously, as it is during the intensive practice phase, the stutter undergoes a partial extinction. In a minority this extinction of the stutter is almost complete, but for most people after a period of relative freedom the stutter gradually recurs and establishes its previous relationships to particular words in particular situations. Anxiety reinforcement recurs and the

stutter slowly grows in severity towards its pre-treatment level. If, in addition to the specific anxiety related to speaking, there is a high degree of neurotic anxiety, then a wider variety of situations will be feared and the reinforcement of the stutter will be correspondingly greater. When the general level of anxiety is low, situations will only threaten if the individual has stuttered in them recently, and if the intensive phase of therapy was effective this will not have been the case for some time. In other words the validity of therapeutic success can be relied on if there is little neurotic anxiety, but is less and less reliable the more neurotic anxiety there is.

This implies, and we think with justification, that while any stutter persists the danger of relapse remains, and only when the individual is completely free from stutter without using S.T. speech will the danger of relapse have passed.

None of the subjects in the study are yet in this situation, although some are very close to it. The shape of the improvement curve (Fig. 16) suggests that a further period of intensive treatment somewhere between the 6th and 9th month might result in many more becoming completely free from stutter, and because of this, free from the danger of relapse.

We have emphasised the need for intensive learning of S.T. speech in the initial phase of treatment. This certainly seems to bear a quantitative relationship to the amount of stutter extinguished, for in the severe and moderate stutterers the final result was related to the pre-treatment level of severity. If the effect of the first treatment is to replace severe stuttering by mild stuttering then a further period of treatment might possibly eliminate the habit altogether.

We regard stuttering as a conditioned response and know from our experience with S.T. speech that given the appropriate situation this response can be inhibited or extinguished. And it is because this is a reasonable hypothesis capable of experimental testing, and certainly a phenomenon which would require explanation in any rational account of the aetiology and pathogenesis of stuttering, that we have presented our findings in this incomplete form. This does not imply the view that mechanistic management of the stutter is all that is involved in treatment.

If we may venture an interim comment on treatment, we should say that our pre-suppositions are similar in many respects to those of Van Riper and Sheehan. We fully accept that treatment must deal with the stutterer as well as the stutter, and that its central aim must be to eliminate every tendency to speech avoidance whatever the source. In some subjects, and this applies particularly to children who have not yet reached Phase 4, the emotional element is not disabling and in them the use of S.T. speech carried out in a consistent group may well be all that is required. In many adolescents and adults, although ease of communication may be increased by S.T. speech, continuing primary or secondary neurotic anxiety will require psychotherapy. And from the experience of others as well as our own, this can best be given in a group situation.

Our studies in treatment will continue and we shall present our conclusions when we can reliably do so. In the meantime, we have not enough evidence to recommend the general use of S.T. speech in the management of stuttering in adults, although the preliminary results in children appear promising. Careful experiments with this aspect of treatment in other centres are clearly needed to establish its value and limitations.

The Syndrome of Stuttering

In this monograph five studies in the syndrome of stuttering are reported. Each study has been essentially independent of the others and as yet no attempt has been made to draw general conclusions. In this, the last chapter, it seems proper to attempt to describe the syndrome and relate the findings of the studies to the work reviewed in Chapter 2.

Incidence and Prevalence

Stuttering appears to be a common disorder within the setting of the European Western Culture and probably within African and Asian cultures as well. In Newcastle upon Tyne the incidence of definite stuttering was at least 3 per cent, although, because of cases in which early remission occurred and cases of later onset, the prevalence seldom rose above 1 per cent. It is probable that these figures have a much wider application.

In addition to this 3 per cent of definite stutterers a further 2 per cent of children were noted to 'hesitate or stammer' during the acquisition of speech. These were reminiscent of the developmental stutterers described by Métraux (1950). It thus seems likely that the 3 per cent of definite stutterers develop from a much larger pool, and perhaps 5-10 per cent of all children have a particular tendency to repeat sounds and syllables as they develop speech. Stuttering may be considered to be a developmental disorder, with a high prevalence of sub-clinical cases at the time children are learning to speak and thenceforth a gradual decline in prevalence. It is only as this early stage is passed that the more persistent and pathological forms of the disorder become apparent. In the 1,000-Family Study 1 per cent of the children became persistent stutterers. Unfortunately the longer the disorder lasts the more severe and complex the symptoms become. Hence it is this group of persistent stutterers that poses the special therapeutic problems. Little appears to be known about the prevalence in later life. The results of the pilot survey of a general practice were consistent with there being little further decline below the 1 per cent prevalence noted at 15 years.

Three factors other than age would appear to affect the prevalence of stuttering decisively. They are sex, intelligence and family background. In Chapter 2 evidence was presented that not only do more boys than girls stutter but that this male predominance becomes more pronounced as the children grow older. There are two possible explanations for the sex difference; stuttering may be a transient phenomenon confined to early life in girls, or in later childhood accessions to the group may be limited to boys. Judging from the 1,000-Family Survey the former possibility appears to be more likely, for the girls had a similar age of onset to the boys but stuttered for a shorter length of time. Further confirmation was provided by the survey of school children in which it was found that the girls tended to be milder stutterers than the

boys and therefore commonly to be still in Phase 1 with spontaneous remission likely. In spite of the milder degree of stuttering the results of the survey confirmed the observation of West *et al.* (1939) that girls more frequently had a positive family history of stuttering than did the boys and that they were more heavily endowed with the deficits in environment and ability that appear to predispose to stuttering. From the analysis of the patterns of inheritance (see Chapter 7) it seems possible that a genetic factor may modify the manifestations of stuttering among girls. This may be related to the genetic factor that ensures that girls develop speech at an earlier age than boys.

The relation between intelligence and stuttering is a vexed question, in that the studies of different investigators have given contradictory results. Stutterers attending clinics for treatment appear to be of above average intelligence. The mean I.Q. of those participating in the S.T. speech project was in the high average range, and they were a cross-section of those who attended the clinic. Yet from the reports in the literature (see p. 7) and from the results of both surveys, it would seem that stuttering is more common among those with low intelligence. The lower the I.Q. and the more likely the possibility of brain damage, the higher the incidence of stuttering is found to be. The most plausible explanation for this paradox probably lies in the increased importance of a handicap to communication amongst the able, coupled with the ready availability of treatment for this segment of the community. Their predominance in clinic populations may thus be an artefact.

Moncur (1951) and Johnson (1959) both report that more stutterers than non-stutterers come from homes in which the family relationships are disturbed. To both these investigators the defect appears to arise from the attitudes of the parents, who appear to be too rigid and demanding with their children. In the Newcastle upon Tyne studies there was an association between stuttering and social pathology in the home. It was not, however, in the direction described by Moncur and Johnson, for a significant proportion of mothers showed an inability to manage themselves, their homes or their husbands, not so much on account of neuroticism as through some degree of inadequacy of intellect and personality. In the upper social groups, however, there were able neurotic mothers who, fitting Johnson's description, appeared to have made excessive demands on their children. In the School Survey material they were few in number and so were masked by the much larger group of inadequate mothers who were unable to cope.

Aetiology

In stuttering particularly, it is profitable to separate the aetiology or cause of the condition from the pathogenesis or manner in which the symptoms are produced. Although it is not possible to identify with confidence either the causal factors or the pathogenic processes associated with stuttering, it is possible to construct a working hypothesis which accords with many of the observed features of the condition.

There is much evidence for some contribution to causation by a genetic factor. Stuttering may be transmitted as a single dominant gene, the penetrance being modified by other genetic and environmental factors. Another possibility is that it is the product of multifactorial inheritance, frank stuttering occurring when genetic loading, or the

unfavourable environmental settings in which it tends to become manifest, or both these factors, exceed a certain threshold.

If a dominant gene is responsible then we might hope that those endowed with it might differ from those free of it in some way other than the occasional manifestation of a stutter. One suggestion is that such children may be especially prone to repeat sounds and syllables as they develop speech. They would then form a relatively distinct group identifiable from other children troubled only by the normal non-fluencies of phrase and word repetition. More research upon the occurrence of sound and syllable repetition both within the population at large and among the relatives of stutterers in particular is undoubtedly warranted.

Genes of minor effect may be important, whether considered to be sufficient in themselves as causes of stuttering or whether they merely act to alter the rate or mode of manifestation of a single dominant gene. Some clue as to their influence may be gained from Chapter 5 when the characteristics that differentiated stutterer from control were discussed. Late talking, poor talking and mild intellectual deficit were significantly associated with stuttering. In each of these conditions environment undoubtedly plays a part, but in the absence of any acquired lesion the finding does suggest that in addition, constitutional factors of genetic origin have been operative. In girls an earlier ability to talk is likely to be a genetic effect that in part may determine their lowered incidence of stuttering.

Among the stutterers in the School Survey a positive family history of stuttering did not correlate significantly with any other item. This finding is consistent with a genetic predisposition being distributed uniformly throughout this group. That all cases are genetically determined is unlikely, for both Ingram's (1963) figure of 15 per cent among those with cerebral diplegia and Schlanger and Gottsleben's (1957) 17 per cent among those with known brain damage are probably higher than the frequency of the genetic predisposition if the condition is transmitted in a dominant fashion. A study of the familial incidence of stuttering among such groups might elucidate this possibility and help to decide between dominant and multifactorial inheritance. Nevertheless, apart from these few organically determined cases the remainder would appear to require the genetic predisposition, whether it be dominant or multifactorial, to become stutterers.

If it is transmitted as a dominant, about 10 per cent of the population will possess the relevant genetic endowment. Yet, in the longitudinal 1,000-Family Survey it was only possible to identify 5 per cent of the population as stuttering at any time and only 3 per cent with any degree of certainty. Only 1 per cent went on to become persistent stutterers. Presumably other genetic and environmental factors help to decide whether stuttering becomes manifest at all, or, if it should develop, the period over which it persists. For the purpose of discussion it is probably better to regard stuttering in the opposite fashion, as a condition that will not become manifest unless other adverse factors are concurrently operative.

The additional handicaps required for manifestation of the gene are liable to be numerous, and extensive investigations would be necessary to elucidate all those likely to occur. The factor analysis of the observed characteristics of the 80 stutterers

(see Chapter 6) suggests that there were three common settings (reflecting a combination of environmental and genetic factors) in which stuttering had evolved.

The first and most important was described by Factor I. It seems probable that a lack of ability to 'think, talk and behave' is related to stuttering. Perhaps this type of child, because he is hampered genetically, is unable to cope with the development of fluent speech and so begins a repetitive stutter. These children commonly come from homes in which there is a degree of adverse social pathology so that little help is available to assist the child in his predicament. Not only was this the most important factor in this population study but it was also quite evident in the items that distinguished stutterers from non-stutterers within the 1,000-Family Study.

Another constellation of items described very different circumstances which were also conducive to stuttering. Factor III described able, anxious children who had difficulty in developing or retaining fluent speech, under the twin handicaps of their genetic endowment and the parental pressure upon them to succeed. It was not evident from this study whether the stutter arises independently of the emotional disorder, or is a direct consequence of the anxiety. The work of Moncur (1951) and Johnson (1959) suggests that both causes are likely in particular children. The type of stuttering reflected in this factor was not prominent in our material yet it may be more important among those attending hospital clinics for treatment, because of the availability of treatment for this segment of the population.

In the survey material there was another factor of rather less aetiological importance, for Factor II appears to be primarily descriptive of the severe syndrome.

Overactivity, irritability and articulatory apraxia, which were common features in these children, seem to be associated with a rapid increase in the severity of stutter and hence in its persistence. These are features also commonly associated with brain damage in children, which appears to be associated with an increased incidence of stuttering. Hence it seems likely that in a small proportion of children the items described by this factor will play an aetiological role; these cases will tend to merge in their clinical features with those in which definite though minimal brain damage plays a part.

These three factors were orthogonally related. In the School Survey stuttering in a particular child seemed generally to have arisen from the combined contribution of two or more of these factors, rather than the operation of any one of them alone. Some children however had significantly low loadings on all three factors. In these children either other environmental influences were at work which were not statistically evident in this study, or the genetic predisposition was strong enough to precipitate stuttering unaided. Both possibilities were probably true for particular children.

Pathogenesis

We have seen that from an aetiological point of view stuttering can be regarded as the product of certain adverse environmental factors acting upon a genetic matrix. From the pathogenetic point of view there is reason to believe that these causal factors operate by distorting the pattern of learning of speech.

In the five studies reported in this monograph there is certain indirect evidence

that stuttering is probably a complex learned habit. Among the 80 school children the mothers of the severe stutterers remembered the disorder beginning as mild repetitions that were only later joined by prolongations and blocks, and finally by the associated facial and body movements. In the mild cases the disorder had remained limited to simple repetitions. Severity, that is the frequency of the interruption to speech, appeared to increase with time, being intimately related to the duration of the disorder alone. Mild stutterers did not differ significantly from the more advanced moderate and severe stutterers on any observed characteristics. The factors making for severity are therefore obscure. There is a certain amount of evidence to suggest, however, that the severe syndrome arises as a learned elaboration of the early mild repetitive form of the disorder.

The immediate and complete control of stutter by an alternative speech habit (see Chapter 8) is difficult to explain on other grounds than as an inhibition of a learned response. It was of interest also that when S.T. speech momentarily extinguished the stutter it was possible to find in two cases an underlying language disability that had persisted into adulthood. This may well have been the original disability from which the later stutter had been elaborated as a result of learning.

The descriptions we have elicited of the mode of evolution of stuttering were consistent in character and also followed closely upon the account given by other workers such as Bloodstein (1960). They gave a clear picture of a disorder beginning with mild repetition and developing into prolongations and blocks, with associated facial and bodily movements becoming apparent at a later date.

The learned response theory is an unsatisfactory explanation if we have to consider the appearance of repetitions in a normal-speaking child as adaptive behaviour, but if, as seems probable, quite different factors produce the initial repetitions, the theoretical problems associated with the elaboration of the disorder are considerably simplified.

The frequent occurrence of involuntary repetitions in the speech of a child with an early stutter soon lead him to be able to anticipate them and relate their occurrence to particular words. Soon certain words and situations themselves become conditioned stimuli that arouse anxiety specifically related to speech. Some children never pass this phase, and one presumes that in their case the amount of anxiety is minimal and spontaneous remission of the repetitive stutter occurs before it becomes reinforced. Those children in whom stuttering continues and in whom saying the words has become associated with anxiety have the stutter reinforced by a series of mechanisms. In the early stages the most important of these would seem to be reinforcement from the reduction in anxiety consequent on saying the feared word and getting it over, but also reinforcement because the stutter delays having to say the feared word. It is clear that these two drives, both of which commonly co-exist in stutterers, will tend to lead to an unstable equilibrium conducive to stuttering. When stuttering actually occurs it confirms the expectation that it would occur, and this probably lends further reinforcement to the stutter.

The more elaborate vocal and bodily symptoms occur because the stutterer, anticipating difficulty, uses the prolongations, hard contacts or breathing mannerisms

to help him say the difficult word. For a while these are effective in easing his anxiety, but if they are practised regularly as part of the stuttering complex they soon become an integral part of the total involuntary stutter pattern. Their appearance in turn generates further anxiety about the act of speaking. The word and situation avoidance symptoms which soon follow are initially effective in avoiding difficulty and are certainly reinforced, yet as they become frequent they too form a most disabling aspect of the disorder. The clinical course of stuttering forms an excellent illustration of how a complex and variable habit can be built up by selective and repetitive learning situations, which cause anxiety to be attached to an increasing range of situations associated with speech. These too are consistent with a learned pattern of behaviour.

Course, Prognosis and Outcome

The clinical manifestations of stuttering were described in Chapter 2 when the work of Bloodstein was considered. The observations of the 1,000-Family stutterers were not sufficiently detailed to confirm his work conclusively, although the information available in this and the school survey is consistent with his ideas about the nature of the symptoms and their occurrence along a continuum in time. There is an urgent need for research on a longitudinal basis that would further evaluate his findings.

Phase I is characterised by mild repetitive stuttering with spontaneous remissions and intermissions. In the School Survey it appeared to be the mode of onset in all and was still descriptive of the stuttering of some. In Phase II the disorder becomes chronic and in the survey it was perhaps as common as Phase III when the disorder is more severe and chronic but still has the disability confined to the speech symptoms. The emotional reactions to stuttering become prominent in Phase IV. This phase was not particularly evident among those in the School Survey although many of the adolescent and adult stutterers in the S.T. speech project were certainly in this phase—the added emotional concomitants making treatment more difficult. Phase V, the stage of acceptance of the disability and the attainment of an equilibrium in regard to speech, was shown by some of the adults in the project.

This concept of the development of the syndrome in an orderly fashion has considerable value for it expresses in detail the pathogenesis of the disorder and also has implications concerning prognosis and treatment. The more developed the stutter, the less likely is a spontaneous remission, and the more difficult treatment becomes. Thus the prognosis of stuttering appears to depend on its duration, or, in terms of the foregoing formulation, on the length of time spent in 'learning to stutter.'

In the 1,000-Family Survey the developmental stutterers began early but remitted within months, the benign stutterers began later but remitted within years, but the persistent stutterers began early and went on inexorably for ten or more years, with no apparent likelihood of remission. In this survey, then, although only one-fifth of the total went on to be persistent stutterers, half of those stuttering at 5 and three-quarters of those stuttering at 10 became persistent. It is presumed that those in whom remission occurred had only mild symptoms. Detailed information from the School Survey about the prognosis of those stuttering at 10 or 11 will be available when the cases are reviewed at 15 years.

Treatment

Spontaneous remission is common in the younger stutterer, and this fact needs to be taken into account in considering those referred for treatment. As two-thirds of the stutterers in the 1,000-Family Survey had symptoms for less than two years, a child need not necessarily be considered for treatment unless the disorder has lasted longer than this. The clinical features of the disorder however are probably a better indication for treatment than the duration of the stutter even though the two correlate highly. Natural remission would seem likely in mild Phase I stutterers, equivocal in Phase II and unlikely in Phases III, IV and V.

If therapeutic endeavours are confined to moderate or severe stutterers of more than two years' duration, any sustained improvement obtained will probably be a result of the treatment and not due to natural remission. Some such assumption as this radically simplifies the problem of assessing the efficacy of treatment, a problem which must be solved if differing methods are to be compared and evaluated.

In young children in whom current emotional pressures may still be operative as causes, wise counselling of the mother and gentle handling of the child along the appropriate lines should hasten a natural remission. Such counselling will, of course, be directed towards general psychological influences of an adverse kind. In most older children, adolescents and adults, the precipitants are no longer important, for the condition has become independent of them and exists as a self-reinforcing habit. In this group the aim of therapy is to abolish the avoidance behaviour. An attempt must be made to divorce the stutter from the anxiety due to external environmental cues such as specific words in specific situations, so that the reinforcing mechanisms become inoperative.

With children in the latency period or with mature adults, speech situations will carry a reality threat only and this is reasonably simple to cope with. In adolescents and young adults many more situations are anxiety-provoking and so the problem is complicated by the secondary emotional concomitants of the disorder. In those who suffer from an independent neurotic disturbance a still wider range of situations will tend to provoke anxiety. Their reality testing will then be defective and the problem may be insoluble until the more disabling effects of the neurosis are diminished by time or psychotherapy.

Most techniques currently used in treatment do aim at separating the stutter from the experience of anxiety. Direct symptomatic therapies help by giving the stutterer a device he can use to eliminate the occurrence of the three primary reinforcing conditions (anxiety-reduction when the stutter is over, delaying the saying of the word, confirmation of the expectancy of stuttering). Voluntarily altered forms of stuttering or of speaking all decrease or circumvent the specific word anxiety, as do relaxation techniques, hypnosis and distraction devices or even simple reading practice. But these are not enough, for the stimulus has generalised beyond mere words to all manner of speech situations and thence to interpersonal situations in general. It is here that simple forms of psychotherapy become essential, so that the stutterer may again understand that these situations are not essentially anxiety-provoking, that he is not doomed to repeated failures and that they can be faced

realistically. This learning of new and more realistic attitudes is often most simply carried out with a group of stutterers. It is made much easier if concurrent symptomatic therapy results in sufficient control of the stutter to give the patient experience of fluent speech so that he may communicate freely. S.T. speech is a simple method of achieving this.

The unlearning of a habit which has been practiced for many years will take a long time. The course of improvement will be marked by periodic relapses as the stutter again, for extraneous reasons, temporarily becomes conditioned to other sources of anxiety. Persistent effort by the stutterer and his therapist should ultimately succeed if sufficient attention is paid to both the stutterer and his stutter, as they both become divorced from anxiety and cease to avoid now non-existent cues for danger.

The Need for Further Research

Throughout this monograph the need for further methodical research has been evident. There is a need for further information about the natural history of stuttering. More knowledge is needed about the pool of developmental stutterers from which they arise; are the stutterers qualitatively or only quantitatively different from the developmental cases in whom the habit has waned? Reports on the growth of the syndrome are required, for as yet Bloodstein's work is unsupported by independent enquiry. The effects of stuttering upon occupational success, choice of marital partner, success in marriage, and social adjustment in general, are quite unexplored, for it may not be as benign a condition as it seems. More facts about the course and outcome of the disorder in adult life are needed, for very little is known about the ultimate prognosis.

Research into aetiology would need to elucidate the genetic problem further. Some of the sibs of stutterers may on detailed investigation prove to have a *forme fruste* of the stuttering syndrome or some other manifestation of the genetic factor when no definite disorder of speech can be demonstrated. It would also be possible to clarify the status of delayed auditory feed-back by means of a simultaneity type of experiment (Efron 1963) using visible and audible cues. Research into the special forms of stuttering associated with cerebral disease in children, and dysphasia or severe emotional stress in adults might also throw further light upon the aetiology of the syndrome.

Further studies on the pathogenesis of the disorder would be rewarding, especially in regard to reinforcement mechanisms and their effective inhibition by techniques of therapy. Finally there is a need for systematic assessment and comparison of results of the different forms of treatment carried out in matched groups of cases so that the various approaches may be properly evaluated. This should improve immeasurably the training available to future speech therapists.

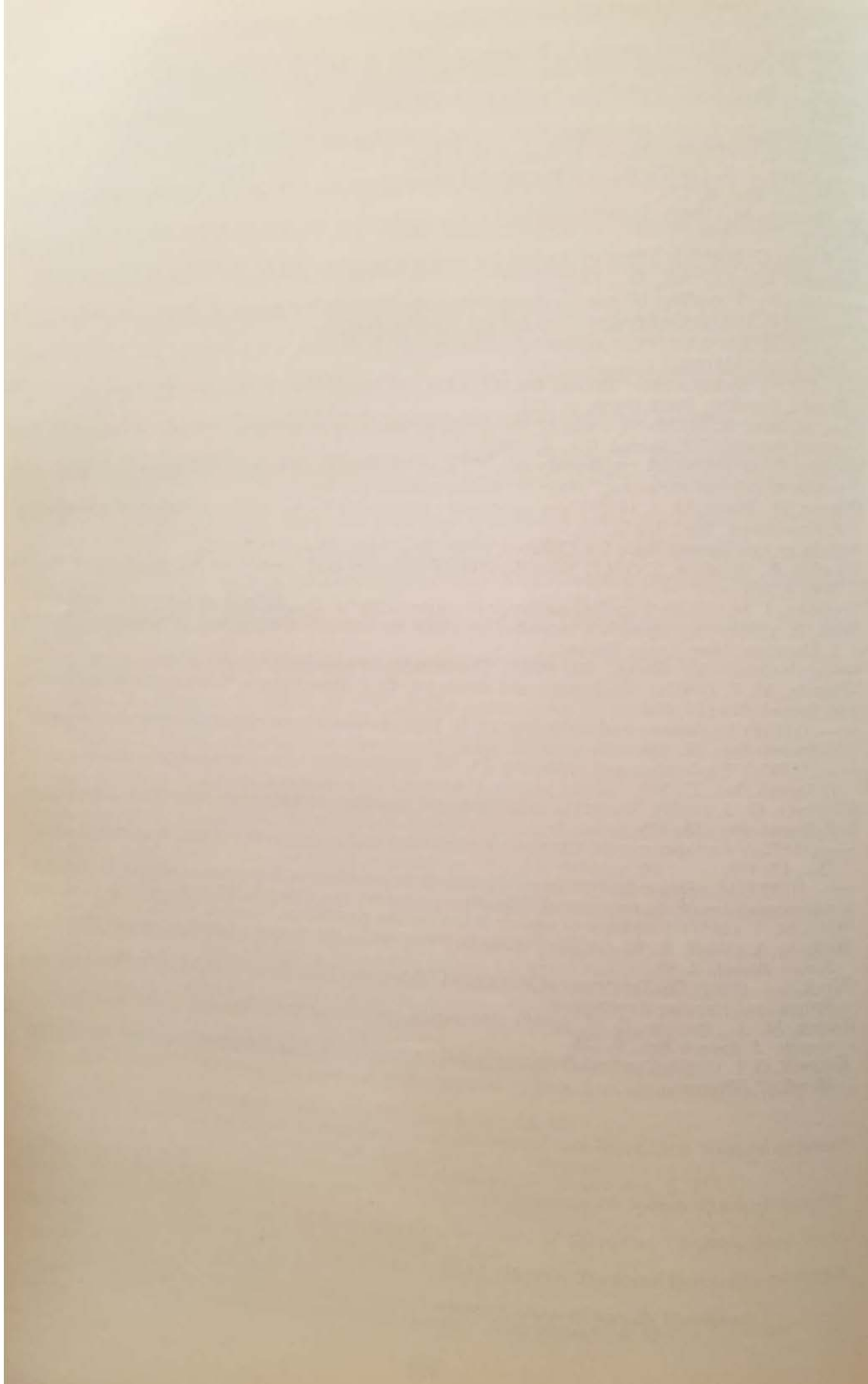
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The Appendices

Appendix I

THE STATISTICAL ANALYSIS OF INTERGROUP DIFFERENCES

For the first series of statistical analysis the following 37 items were chosen, and coded in accordance with the criteria in Chapter 5. The codings ran as follows:

A SEX	1 Male	2 Female	
<i>Items relating to the home</i>			
B ONE-PARENT HOME	1 Never	2 Temporary	3 Permanent
C FAMILY LIFE	1 Good	2 Fair	3 Poor
D HOUSING	1 Adequate	2 Temporarily inadequate	3 Permanently inadequate
E EXTENDED FAMILY GROUP	1 Normal	2 Dependent or isolated	
<i>Items relating to the mother</i>			
F MATERNAL GRAND PARENTS	1 Normal	2 One abnormal	3 Both abnormal
G SCHOOL RECORD	1 Good	2 Average	3 Poor
H WORK RECORD	1 Good	2 Average	3 Poor
I HUSBAND'S PERSONALITY	1 Normal	2 Unsatisfactory	3 Abnormal
J NEUROTICISM	1 Stable	2 Handicapped	3 Disabled
K INTELLIGENCE	1 Above average	2 Average	3 Below average
L FAMILY HISTORY OF STUTTER	1 None	2 Without contact	3 With prolonged contact
<i>Items concerning the child</i>			
M BIRTH CIRCUMSTANCES	1 Normal	2 Abnormal	
N SIBLING RANK	1 First born	2 Middle child	3 Youngest
O LATE TALKING	1 Under 18 months	2 18-23 months	3 23 months and over.
P POOR TALKING	1 Not present	2 Present	
Q GASC ANXIETY SCORE	1 0-9	2 10-19	3 20-35
R FIGURE DRAWING	1 No errors	2 One error	3 Two or three errors
S RIGHT/LEFT DISCRIMINATION	1 No errors	2 One error	3 More than one error
T SCHOOL ATTITUDE	1 Normal	2 Problems	3 Disturbed

U PEER RELATIONSHIPS	1 Normal	2 Poor	3 Disturbed
V ENURESIS	1 None	2 Rarely	3 Regularly
W MODESTY	1 Normal	2 Modest	3 Extreme
X OVER-ACTIVITY	1 Normal	2 Fidgety	3 Over active
Y ANTI-SOCIAL BEHAVIOUR	1 None	2 Some	3 Much
Z OBSESSONAL TRAITS	1 Normal	2 Some	3 Many
A2 AGGRESSION	1 Passive	2 Normal	3 Aggressive
B2 DEPENDENCE	1 Normal	2 Moderate	3 Severe
C2 TIMIDITY	1 Bravado	2 Normal	3 Timid
D2 DISOBEDIENCE	1 Compliant	2 Normal	3 Disobedient
E2 IRRITABILITY	1 Normal	2 Moderate	3 Severe
F2 TEMPER TANTRUMS	1 Normal	2 Moderate	3 Severe
G2 WESCHLER INTELLI- GENCE SCALE FOR CHILDREN	1 I.Q. 110 and above.	2 I.Q. 90-109	3 I.Q. 89 and below
H2 WORD RECOGNITION TEST	1 R.Q. 110 and over.	2 R.Q. 90-109	3 R.Q. 89 and below
I2 VERBAL/PERFORM- ANCE DIFFERENCE	1 Below -10	2 -10 to +10	3 Over +10
K2 SCATTER	1 Under 2	2 2 and Over	
L2 STUTTER	1 None	2 Mild	3 Moderate or severe

Appendix 2

THE FACTOR ANALYSIS OF THE STUTTERERS

The following 37 features were used in the analysis of the group of 80 stutterers. The items not included in the analysis in Chapter 5 are defined.

A SEX			
B SOCIAL CLASS			
C SOCIAL MOBILITY	1 I and II	2 III	3 IV and V
D ONE-PARENT HOME	1 Downward	2 Static	3 Upward
E FAMILY LIFE			
F HOUSING			

Items concerning the Mother

G WORK HISTORY			
H NEUROTICISM			
I OBSESSONALITY	1 Normal	2 Traits only	3 Neurosis

J CONTENTMENT	1 High	2 Medium	3 Low
K INTELLIGENCE			
L PERI-NATAL CIRCUM- STANCES	1 Normal	2 Abnormal	

Items concerning stutter

M SEVERITY	1 Mild	2 Moderate and severe	
N REPETITION	1 Absent	2 Present	
O PROLONGATIONS	1 Absent	2 Present	
P BLOCKS	1 Absent	2 Present	
Q LATE TALKING	1 Under 24 months	2 24 months and over	
R POOR TALKING	1 No	2 Yes	
S AGE OF ONSET	1 2-3 years	2 4-6 years	3 7 and over
T YEARS OF FLUENT SPEECH	1 None	2 1 or 2 years	3 3 or more years.
U PRIOR TREATMENT	1 None	2 Some	
V STUTTERING IN PARENT OR SIB	1 Not present	2 Present	

Behaviour disorder in child

W ANXIETY AT INTER- VIEW	1 Normal	2 Mild	3 Marked
X INTERPERSONAL RELATIONSHIPS	1 Normal	2 Problems	3 Disturbed
Y SCHOOL ATTITUDE	1 Normal	2 Problems	3 Disturbed
Z ENURESIS			
A2 OVERACTIVITY			
B2 ANTI-SOCIAL BEHAVIOUR			
C2 OBSESSIONALITY			
D2 AGGRESSION			
E2 DEPENDENCE			
F2 DISOBEDIENCE			
G2 IRRITABILITY			

Ability in child

H2 WISC I.Q.
I2 WORD RECOGNITION TEST
J2 FIGURE DRAWING
K2 RIGHT/LEFT DISCRIMINATION

CORRELATION MATRIX FOR 80 STUTTERERS

Criterion = L2 = Stutter

A	
100 B	
018 213 C	
005 176 147 D	
-013 179 370 237 E	
-071-054 202 103 083 F	
-103 006 249 210 194 069 G	
-145 117 316 102 191 202 384 H	
-079 391 627 097 324 072 224 176 I	
112 080 401-070 230 032 163 261 276 J	
008 083 277 102 180 200 608 323 230 059 K	
197 005 052 106 041 042 061 103-005 077 036 L	
135 323 078 017-066-031-014 120 156 126-028 197 M	
-057-041-085-141-091 007-068-122 047 090-053-087 015 N	
-014 188 325 089 164 062 192 202 278 097 218 146 118 113 O	
005 115 189 076 180 013 236-039 223 033 153 205 117-005 426 P	
190 076-007 102-028-069 045-043 051-012-005 078 059-082 121-046 Q	
156 050 077-026 035 055 113 085 010-077 199 134 052-021 238 217 061 R	
-080 054 154 059 112 093 245 137 097-081 370 032-067-010 216 169 043 420	
-131 051 261 149 088 172 099 187 125 179 047 042 071-010 146 114-083 087	
021 003 162-134 058 056-060 038 113 125-076-038 082-037 018 044-164-038	
057 200-051 040 010-037-051-107-001-002-106-051-009-028-019-042 096 238	
067 056 065 045-036 079 273 079 090 107 242 090 079 053 071 152-005 041	
-107 146 092-036 090 108-046-058 087 025-038-020 096 009 160 210-137 214	
-102 051 240 105 099 182 118 220 147 090 113 098-060-090 162 130-131 179	
-039-139 019 040-105 022 020-015-009 002-044-198-065 035-122 009-110-190	
069 140-022 165 137-046-004 056-084-026-002 178-001 015 047-002 049 171	
-038 068 088-116-005-015-058 076 155 024-056-009 126 072 129 141-004 112	
017-016-072-149-093-007-006 015 075-096-002-107 070 079 028 000-038-037	
042 134 115 055 013 097 053 174 041 053 190 119 042-039 119 019-174 189	
059 095 140 084 083 067-088 063 040 007 003 025-035-076 160 214-118 175	
-131 207 120 210 038 006-042 053 241 021-031-049-007 079 146 117-076-030	
133 215 215 174 138 095 387 263 171-024 429 099 108-158 309 228 123 505	
-013 199 217 228 066 074 405 164 212-066 448-007 037 016 283 180 085 350	
021 031-109-086-007-043-013-072-063-160 033 027 070-038-132-006-217 100	
197 124-068-146-012-126-099-105 057-084 078 026 038-060-021 074 165 260	
000 180 113 146 135 042 165 173 068 033 112 404 117-083 299 341 052 154	

Decimal point omitted)

20 S
 87 145 T
 38 -126 275 U
 38 113 046-035 V
 041 148 134 123 072 W
 214 058 166 120 035-019 X
 179 092 158-055-041 063 206 Y
 190 -152 094 248 076 285-067-194 Z
 171 003-089-257 057-203-044 223-191 A2
 112 123 132 137-052 099 338-030 035-128 B2
 037 -005 027 266 091 089-122-272 279-266 118 C2
 189 202 022-100-024-108 234 325-353 244 116-069 D2
 175 117 178 187 022 011 400 107-072-010 397-050 215 E2
 030 -015 230 141 109 033 235 324 080 158 234-010 177 441 F2
 505 508 132-000 130 164 069 227-230 094 050-012 168 055-016 G2
 350 408 157-090 208 205 090 134-107-015 093 019 103 002 029 640 H2
 100 -035-127-007-145-116 045 015-071 060-080-076 061-058-086 042-069 I2
 260 153 013-061 030-000-029-109-136 106 017 061 085-002-103 252 025 077 015 K2
 154 140 168-110 096 132 086 060-049 068 101 044 118 082 048 197 048 031 313 091 L2

PRINCIPLE COMPONENT FACTOR ANALYSIS OF TOTAL MATERIAL
80 STUTTERERS AND 80 CONTROLS N = 160

FACTOR LOADINGS
(Decimal point omitted)

Correlation with Stutter		Unrotated		Rotated - 28°		Unrotated	
		FA	FB	FA ¹	FB ¹	FC	FD
A	0*	0	-237	111	-209	-037	-204
B	180	377	035	317	204	-173	-060
C	113	599	333	373	575	118	273
D	146	299	-051	288	095	033	283
E	135	390	107	294	277	020	328
F	042	241	138	148	235	071	184
G	165	539	-102	524	163	493	177
H	173	465	105	362	301	201	325
I	068	521	338	301	543	116	101
J	033	233	330	051	400	117	305
K	112	582	-200	608	096	392	075
L	404	197	-188	266	-074	-127	102
M	177	163	073	110	141	-063	-149
N	-083	-090	142	-146	083	002	-113
O	299	555	070	457	323	-046	-088
P	341	441	096	344	292	-078	-193
Q	052	039	-287	169	-235	159	-127
R	154	466	-374	587	-111	-195	-389
S	140	522	-290	597	-011	078	-269
T	168	350	383	129	502	-007	-059
U	-110	034	568	-237	518	058	-234
V	096	081	-089	114	-041	-022	-320
W	132	250	173	140	270	393	-254
X	086	280	273	119	372	-521	-189
Y	060	411	-013	369	182	-304	364
Z	-049	-202	469	-398	319	407	-179
A2	068	122	-386	289	-284	-379	323
B2	101	212	363	017	421	-284	-398
C2	044	-086	253	-195	183	315	-461
D2	118	350	-159	384	024	-465	140
E2	082	291	328	103	427	-526	-209
F2	048	253	419	026	489	-414	0
G2	197	694	-386	794	-015	120	-247
H2	048	621	-241	661	079	236	-241
I2	031	-080	-209	027	-223	-158	033
K2	091	081	-351	237	-272	-090	-378
Sum of Squares		4.74	2.69	4.29	3.14	2.39	2.14
Correlation with Stutter		.52	-.28	.59	-.05	-.07	.08

* This figure is necessarily 0 because of the matching procedure.

PRINCIPLE COMPONENT FACTOR ANALYSIS OF 80 STUTTERERS.

FACTOR LOADINGS (Decimal point omitted)

ITEM	FACTOR I	FACTOR II	FACTOR III
A	+036	+264	+112
B	+451	+103	-433
C	-116	+047	+333
D	+315	+108	+140
E	+548	-037	+113
F	+244	+093	-177
G	+553	+144	-020
H	+372	-037	+389
I	-177	-171	+192
J	+405	+047	+183
K	+566	+136	-344
L	+080	-109	+167
M	-039	-537	-447
N	+258	-009	+161
O	+039	-247	-320
P	-289	-415	-387
Q	+425	-204	+024
R	+356	-555	-169
S	+345	+571	-111
T	-097	+615	-015
U	-068	-528	-126
V	+027	+271	+148
W	+133	-141	+439
X	+047	-447	+188
Y	+326	-299	+154
Z	+013	-089	-094
A2	+112	-624	+407
B2	+366	-033	+247
C2	-212	-170	-174
D2	+194	+167	+470
E2	+187	-430	+101
F2	+443	+108	+466
G2	+284	-336	+429
H2	+746	+124	-307
I2	+590	-035	-494
J2	+573	-119	+006
K2	+591	-034	-204
Sum of Squares	4.488	3.216	2.827

CORRELATION MATRIX FOR 80 STUTTERERS

A
 -009 B
 -027-433 C
 124 156 132 D
 031 161-186 215 E
 034 272-042 145 272 F
 -131 215-075 078 375 025 G
 068-015-145 081 561-085 366 H
 029-064 059 024 030-121-168 235 I
 -005-154-001 231 562-008 416 642 090 J
 006 329-097 120 268 120 389 143-173 301 K
 091-165 034 018 157 094 083-025-120 159-069 L
 -105-084-078-131 057-029 031-036-031 028 083 000 M
 -166 137-011-122 231-100 103 208 105 168 066 149-126 N
 -084 079-081 192 100 054 153-017-006 071 060-027 492-061 O
 025-052-044-164-130 015-174-160 047-042-029-067 563-388 352 P
 -024 066-087-032 304-022 236 157 069 166 144 065 044 321 005-196 Q
 -105 116-037-054 095 054-047 000-163 028 207 113 345 126-023 225 375 R
 -013 132 140 109 135 130 200-040-176 103 262-021-204 094-179-273 078-071
 027 003 144 151-039 137-006-109-084-071 026 044-233 027 031-148-305-469
 -306-052 073 018-022 094-211-127 047-042 127 147 282 030-027 093 013 338
 356-014 112 055 013 094-028 042-037 025-029-067 000-149-027-067-091 000
 -062-144 136 185 040 097-031 017 053 006-113 081-076 061-092-172-044-038
 -184-007-073-087 226 047 047 160 058 057-073 011 130 123 004 143-019 130
 -145 060-040 083 229 176 076 223-013 050-018 035 038 144-079-114 088 205
 035 003 004 165-104-067-092-061 117 038-205 056 090-011 122 015-071-039
 -141-111 138 134-034-094-085 037 104-150-159 111 031 012 156 026 148 209
 -119-107-061 102 149 144 145 179-141 061 042-011-172 025-170-147 073 259
 -150-018-037-142 136 060-020-037 194-025-122 016 032 036-124-027-007-059
 100-107 201 133 088 141 101 055-153 077-046 062-200 083-106-187 046 063
 000 132 091 054-060-151 073 084 153-100-065 089 065 000 081 000 147 206
 103 140 057 087 094-127 233 304-019 088 227-024-229 032-102-214 127 012
 160-056 143 175 159 093-036 104-014 027-050 090 040-083 002 048 011 129
 107 459-062 218 183 192 325-024-151 068 430-030 004 123 050-198 280 182
 020 457-045 190 142 248 129-103-145 037 405-032 130 036 118-032 152 267
 252 152 030 174 043 013 168-051-141 080 213 174 000 078 071-058 148 294
 -133 219-070 008 196 107 279 097-079 158 338-092 071 000-019-092 156 233

S

517 T

-231-243 U

105 140-067 V

-043-051 081 081 W

-107-020 143-077 291 X

-017 032 124-114 077 336 Y

-110-039-066-107 017-059 071 Z

-371-297 195-185 240 229 252-025 A2

061-117 034 079 008-013 230-115 241 B2

012-100 145-155-185 206 149 035-064-165 C2

082-059-137 211 127-125-056 037 046 247-223 D2

-063-191 177-044 060 234 105-040 336-068 093 025 E2

094-016-214 090 222-018 154-078 226 267-446 277 076 F2

048-117 048 090 340 288 216 076 502 101-113 216 288 315 G2

373-015-097 038 112-126 125 109-018 156-191 009 134 148 080 H2

342-037 097-065 000-086 142 175-033 094-008-175 172 007 100 678 I2

055-156-104-012 071-067 142 225 243 187-210 227 193 244 262 561 367 J2

159-075 092 000 062-020 185 138-017 094-116-034 142 233 100 521 395 400 K2

Appendix 3

THE DETAILED RESULTS OF THE S.T. SPEECH PROJECT

ELEVEN-YEAR-OLD GROUP (C)

Personal Details

Case No.	Sex; Age; Social Class			Personality
31	M	11	III	Stable
32	M	11	III	Anxious Traits
33	M	11	II	Stable
34	M	11	III	Stable, Passive
35	M	11	III	Stable

Progress during treatment: Percentage of words stuttered and number of words per minute.

Case No.	Before	2 Weeks	3 Months	6 Months	9 Months	Result
31	3B 30/100	0	0/110	0/110	0/120	Improved and Stable
32	3C 24/50	0	0/110	3/100	1/80	Partially Improved and Unstable
33	2A 7/80	0	0/110	0/115	0/120	Improved and Stable
34	3B 23/100	0	2/100	0/108	3/100	Partially Improved and Stable
35	2B 18/100	0	1/100	0/110	0/120	Improved and Stable

ADOLESCENT GROUP (B)

Personal Details

Case No.	Sex; Age; Social Class			Personality	I.Q.	Before		After	
						N.	E.	N.	E.
11	M	17	III	Some anxiety					
12	M	16	III	Stable	III	34	36	34	42
13	M	16	IV	Depressed —	II	16	27	16	15
				Deprived	III	14	32	16	32
14	M	17	III	Ambitious —					
15	F	18	II	Anxious	I	26	8	2	12
16	F	17	IV	Anxious and Obsessional	II	29	30	38	30
17	M	18	III	Confident	III	20	25	20	25
18	M	18	III	Anxious and Obsessional	I	40	30	34	40
				Self-conscious and	I	26	26	20	36
19	M	19	III	Controlled					
20	M	18	III	Anxious	I	39	24	42	28
				Normal	III	24	38	22	43

Progress during treatment: Percentage of words stuttered and number of words per minute.

Case No.	Before	2 Weeks	2 Months	6 Months	9 Months	Results
11	1C 2/120	0/100	5/90	0/80	1/75	Not Improved
12	3D 26/60	5/80	23/30	17/50	25/40	Not Improved
13	3D 41/30	2/80	14/45	23/45	39/25	Not Improved
14	2C 7/85	0/110	2/100	0/120	5/85	Improved and Stable
15	3D 30/35	1/100	3/120	—	8/110	Partially Improved and Unstable
16	2C 9/100	0/100	10/80	2/150	0/90	Partially Improved and Stable
17	2C 14/50	0/100	2/80	1/150	0/115	Improved and Stable
18	2C 8/55	0/100	1/130	1/110	2/120	Partially Improved and Stable
19	2C 13/80	0/100	2/100	1/100	1/100	Partially Improved and Stable
20	3D 60/15	2/100	23/70	11/100	13/70	Partially Improved and Stable

FIRST ADULT GROUP (A1)

Personal Details

Case No.	Sex; Age; Social Class			Personality	I.Q.	M.P.I.			
						Before		After	
						N.	E.	N.	E.
1	M	28	V	Stable	II	39	35	30	37
2	M	23	III	Stable	III	4	37	—	—
3	M	22	III	Compliant, Anxious	II	36	18	20	28
4	M	24	III	Anxious, Mature, Dependent	I	28	14	40	6
5	M	22	III	Shy, Anxiety-Prone	I	14	36	6	42
6	M	30	III	Dependent and Psychopathic Traits	III	24	36	16	34
7	M	28	III	Stable	III	27	24	9	35
8	M	29	I	Anxiety and Obsession Traits	I	20	14	27	9
9	M	30	I	Self-Critical	II	14	35	18	31
10	M	21	I	Stable	I	19	27	20	31

Progress during treatment: Percentage of words stuttered and number of words per minute.

Case No.	Before	2 Weeks	3 Months	6 Months	6 Months	12 Months	Result
1	3D 37/60	0/80	6/90	0/100	0/120	0/90	Improved and Stable
2	3D 50/70	4/60	13/85	11/90	9/90	10/90	Partially and Stable
3	2C 13/80	0/70	11/80	14/80	15/70	17/35	Not Improved
4	1B 1/100	0/130	0/110	0/120	0/120	0/40	Not Improved
5	3C 62/40	0/120	4/110	5/110	10/100	25/62	Partially and Unstable
6	3D 51/60	8/50	27/60	22/58	32/35	25/41	Partially and Stable
7	3D 56/16	1/70	26/40	16/50	16/50	17/45	Partially and Stable
8	3D 21/60	1/130	8/110	6/100	9/90	10/100	Not Improved
9	3D 52/25	0/120	1/130	1/110	8/100	5/120	Partially and Unstable
10	3D 22/70	0/120	1/130	12/80	4/130	7/90	Partially and Unstable

SECOND ADULT GROUP (A2)

Personal Details

Case No.	Sex; Age; Social Class			Personality	I.Q.	M.P.I.			
						Before		After	
						N.	E.	N.	E.
21	F	22	III	Stable					
22	M	22	III	Neurotic, Dependence and Manipulation	II	30	40	30	37
23	M	25	III	Stable	II	22	33	12	32
24	M	29	II	Stable	II	28	28	36	29
25	M	22	II	Shy, Quiet	I	8	24	16	31
26	M	19	II	Anxious, Neurotic Handicap	II	20	16	16	26
27	M	44	II	Relaxed, Neurotic Traits	II	32	14	16	18
28	M	26	III	Dependent, Anxious	II	8	40	11	41
29	M	23	I	Stable	II	22	16	14	16
30	M	23	II	Stable	I	28	34	28	34
					II	22	20	24	14

Progress during treatment: Percentage of words stuttered and number of words per minute.

Case No.		Before	2 Weeks	3 Months	6 Months	Result
21	3D	25/55	2/100	2/85	1/130	Partially and Stable
22	3D	35/75	2/100	6/85	5/100	Partially and Unstable
23	3D	67/27	20/50	40/21	23/45	Not improved
24	3C	24/80	0/100	0/120	0/160	Improved and Stable
25	3D	67/15	0/100	0/100	2/100	Partially and Unstable
26	2C	12/70	0/100	0/80	1/90	Partially and Unstable
27	3D	24/50	0/100	0/80	0/120	Improved and Stable
28	3D	20/60	11/100	7/70	4/130	Partially and Stable
29	3D	55/20	2/100	21/40	20/50	Not Improved
30	3C	25/56	1/110	1/55	0/75	Improved and Stable

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